Geriatric Nursing 66 (2025) 103586

Contents lists available at ScienceDirect

Geriatric Nursing

journal homepage: www.gnjournal.com

Characteristics of complex non-pharmacological interventions for cognitive stimulation in people with mild to moderate dementia in nursing homes: A systematic review

Julie Guicheteau[a,*], Ümran Sema Seven[b], Jana Boes[a], Ina Monsef[c], Sascha Köpke[a], Ann-Kristin Folkerts[b], Justina Doffiné[b], Elke Kalbe[b], Martin N. Dichter[a]

[a] Institute of Nursing Science, Faculty of Medicine and University Hospital Cologne, University of Cologne, Gleueler Straße 184, Cologne, 50935, Germany
[b] Department of Medical Psychology | Neuropsychology, Gender Studies and Centre for Neuropsychological Diagnostics and Intervention (CeNDI), Faculty of Medicine and University Hospital Cologne, University of Cologne, Cologne, Germany
[c] Institute of Public Health, Faculty of Medicine and University Hospital Cologne, University of Cologne, Cologne, Germany

ARTICLE INFO

Article history:
Received 17 October 2024
Received in revised form 30 June 2025
Accepted 23 July 2025
Available online xxx

Keywords:
Nursing home
Dementia
Alzheimer's disease
Cognitive stimulation
Complex intervention
Psychosocial intervention
Systematic review

ABSTRACT

Methods: A literature search in February 2021, updated in July 2023, using MEDLINE, CENTRAL, PsycINFO, ALOIS, and CINAHL identified 49 studies involving 2,795 participants. We included randomized controlled trials (RCTs) and quasi-RCTs. Intervention components included reminiscence therapy, activities of daily living, physical exercises, cognitive exercises, music and art therapy, reality orientation, and multisensory stimulation.
Results: Variations were observed in procedures, materials, delivery modes, and durations, with a low overall risk of bias. Notably, no studies reported barriers to delivery, and only one included patient input.
Conclusions: The findings suggest the need for improved intervention design and methodologies, including digital adaptations and individualization of group-based components. Future research should employ established frameworks to describe interventions and prioritize patient and public involvement throughout the research process.

Introduction

Dementia is common in people living in nursing homes. It can present differently between individuals, including deterioration of cognitive functions,[1] depressive symptoms, agitation, and loss of independence in activities of daily living.[2,3] International studies have shown that more than 60 % of people living in nursing homes have dementia.[4] These results can also be applied to Germany.[5]

Guidelines have proposed non-pharmacological interventions to address the symptoms and consequences of dementia and promote the cognition, independence, and quality of life of people living with dementia.[6]

Cognitive stimulation (CS) has been defined as "engagement in a range of activities and discussions (usually in a group) aimed at the general enhancement of cognitive and social functioning".[7] CS interventions are non-pharmacological interventions that have been applied in dementia care for a long time, with one of the first randomized controlled trials (RCTs) in reality orientation in 1966.[8] In CS interventions, people living with dementia participate in individualized activities that value their social roles, thereby improving their performance in everyday life and achieving preselected personal goals. The following range of activities can be considered CS interventions[9]: reminiscence therapy,[10,11] reality orientation,[10] cognitive exercises[12] (e.g., word games or puzzles), music therapy[11] (e.g., active or passive listening with or without instruments), activities of daily living[11] (e.g., baking, cooking, or gardening), physical and relaxing exercises[11] (e.g., seated gymnastics) and multisensory stimulation[11] (e.g., sound, touch, and olfactory stimuli).

CS interventions differ from cognitive training and cognitive rehabilitation. Cognitive training corresponds to defining a set of standard tasks to achieve a predefined and individual goal of improved cognitive function.[7] In contrast, cognitive rehabilitation is based on the biopsychosocial model and aims to help individuals achieve an optimal level of physical, psychological, and social functioning.[7] Cognitive training and cognitive rehabilitation differ from one another as cognitive training is based on structured tasks and environments, while cognitive rehabilitation is more tailored to the needs of people living with dementia, aiming to improve or maintain performance related to behavioural or functional goals.[12] Both approaches aim to enhance

*Corresponding author.
E-mail address: julie.guicheteau@uk-koeln.de (J. Guicheteau).

https://doi.org/10.1016/j.gerinurse.2025.103586

the cognitive functions of individuals living with dementia, while CS activities provide a broader range of activities tailored to the needs and wishes of people living with dementia, aiming to improve both cognitive and social functioning.[7]

CS interventions are heterogeneous complex interventions that can be applied in group or individual settings. For this review, we defined "complex interventions" as interventions containing at least two components with different characteristics or two different approaches of the same component, based on established criteria,[13] for example, when we observed a change in the number of groups, the settings, the way to deliver the intervention, etc. We defined components of CS based on previous work,[3,14] including diverse activities such as reminiscence therapy, activities of daily living, physical and relaxing exercises, cognitive exercises, music and art therapy, reality orientation, and multisensory stimulation. A recent Cochrane review update on "cognitive stimulation to improve cognitive functioning in people living with dementia[10]" included 37 RCTs that studied the effectiveness of cognitively stimulating activities, i.e., 26 more than did the previous review.[3] Another recent review included 44 RCTs.[9] Over the last decade, many literature reviews have addressed the effectiveness of CS interventions[9,10,15] as well as facilitating factors regarding the implementation of CS interventions.[16] However, no review has focused on a detailed description of CS intervention components, although describing complex interventions in detail, e.g., using the TIDieR criteria, has been claimed essential.[17] This is of specific importance, as complex interventions seem to have the strongest potential to be effective in improving global cognition, behavioural symptoms, and quality of life in people living with dementia.[10] An in-depth description of complex interventions is crucial for the conceptualization of new CS intervention approaches, replication of trials, and implementation of interventions. However, the inherent complexity remains challenging both in primary studies and in reviews.

Therefore, this systematic review aims to identify, describe, and summarize complex, non-pharmacological CS interventions in nursing homes. Thus, this review will add value to existing systematic reviews by providing a rigorous description of the components included in CS interventions, applying the TIDieR[17] and CReDECI 2[18] reporting guidelines. TIDieR is a checklist and guide for an in-depth description of complex interventions to allow intervention replications, whereas CReDECI 2 is a framework for reporting the development and evaluation of complex interventions in healthcare. Moreover, we analyse patient and public involvement (PPI) processes during all phases of the research process as important measures to design and manage projects while considering the preferences of the target groups via the GRIPP2 reporting checklist.[19] As this review is a part of the development of a nursing home intervention, this review will concentrate only on studies that took place in nursing homes.

Methods

The review follows established methodological frameworks for systematic reviews,[20] applying the PRISMA statement.[21] The review was registered in Prospero (Registration number: CRD42021227904).

Search strategy

An information specialist designed the search strategies. Initially, we conducted a systematic search strategy for MEDLINE (via OVID) with relevant subject headings and free text search terms for dementia in combination with cognitive stimulation and later adapted the search for the following electronic databases: CENTRAL (via Cochrane Library), PsycINFO (via OVID), ALOIS* (Cochrane Dementia and Cognitive Improvement Group's specialized register) (via CRS WEB) and CINAHL (via EBSCO). We initially performed the search on 16 February 2021 and updated it on 20 July 2023. The search strategies can be found in the appendix (Appendix S1).

Inclusion and exclusion criteria

Participants. Nursing home residents living with dementia, ≥ 18 years old.

Interventions. Any type of group-based or individually provided complex cognitive stimulation interventions was included in this review. The studies had to conduct diverse activities like reminiscence therapy, activities of daily living, physical and relaxing exercises, cognitive exercises, music and art therapy, reality orientation, and multisensory stimulation.

Control interventions. We included studies with any kind of comparator, e.g., usual care, optimized usual care, and other non-pharmacological or pharmacological interventions.

Outcomes. Eligible study outcomes were cognitive function, quality of life, behavioral and psychological symptoms of dementia (BPSD), and activities of daily living (ADL). These outcomes were selected on the basis of a previous review.[22]

Study design. We included any kind of study published in a peer-reviewed journal. Popular articles and research published only in summaries or abstracts were excluded.

Other. We included scientific articles published in peer-reviewed journals in English and German without limitations concerning the publication year or dementia status of the participants.

Procedure

We performed data management and extraction in Covidence (Veritas Health Innovation, Melbourne).[23] Two independent reviewers assessed the titles and abstracts of all the search results to identify eligible studies. After the selection of potentially relevant articles, we obtained full reports, which were also assessed by two independent reviewers. We resolved any conflicts by discussion or, if needed, by involving a third reviewer.

Data extraction and methodological quality

One reviewer extracted data from each included study, and a second reviewer independently cross-checked the accuracy of the data extraction. In cases of disagreement, a third author was involved.

We used standardized data extraction tables including the following information: journal, year, country, study design, number of groups, setting, participants, description of interventions and control interventions, cognitive status, quality of life, BPSD and ADL, and main findings according to the Cochrane Handbook for Systematic Reviews of Interventions.[20]

We assessed the methodological quality of the RCTs via the Cochrane Risk of Bias Tool.[24] For quasi-experimental studies, we used the Joanna Briggs Institute's Critical Appraisal Checklist for Quasi-Experimental Studies.[25] Two reviewers independently assessed and scored the methodological quality of the included studies, involving a third reviewer in case of uncertainty.

Data synthesis

Two independent reviewers analysed the components of the included intervention programs in detail by applying the TIDieR[17] and CReDECI 2 criteria.[18] Methods of data synthesis depend on the quality and heterogeneity of existing data. Owing to the complexity of interventions, grouping interventions on the basis of intervention aims or intervention types was not feasible. Therefore, a meta-analysis was not feasible. We analysed the characteristics of studies based on the TIDieR[17] and compared them in terms of procedures,

materials, mode of delivery, intervention provider, and intervention period. To assess the reporting quality of included studies, the CReDECI2 framework was applied. This framework, comprising 13 criteria, allows for a systematic evaluation of key reporting elements, including the theoretical foundation of the intervention, its components and their interactions, contextual considerations, pilot testing and its implications, the control condition, the implementation strategy within the specific context, materials and tools employed, fidelity and process evaluation, internal facilitators and barriers, external conditions, and the resources or costs associated with intervention delivery. To examine patient and public participation, we used the GRIPP 2 checklist for patient and public involvement.[19] As preplanned in the protocol, we performed a narrative analysis.

Results

Description of included studies

The systematic search conducted in 2021 identified n=19,992 references. After removing duplicates (n=2225), n=17,667 records remained. The search update performed in July 2023 identified n=5060 additional references (with n=14 duplicates removed). In total, we screened 22,813 titles and abstracts and n=491 full texts. Finally, we included 49 publications with 2795 participants (range 12−225), with 48 studies published in English and one in German (Fig. 1).

The study facilities were located in Germany (*n=7*), Italy (*n=6*), Japan (*n=6*), the United States (*n=4*), Turkey (*n=4*), the United Kingdom (*n=3*), South Korea (*n=3*), Taiwan (*n=3*), Belgium (*n=2*), Brazil (*n=2*), France (*n=2*), Spain (*n=2*), China (*n=1*), Hong Kong (*n=1*), Iran (*n=1*), the Netherlands (*n=1*), and Portugal (*n=1*). The study participants were people living with mild to severe dementia. The average Mini Mental State Examination (MMSE) score for assessing global cognition was 13.63 (range: 4.3-21.7) for the intervention groups.

Most studies were RCTs (n=38), ten were quasi-experimental studies, and one was a controlled trial.

Methodological quality

Most of the 38 RCTs had a low overall risk of bias (Fig. 2). For "random sequence generation" and "allocation concealment", information was missing in eight and five studies, respectively. The highest potential for risk of bias was found for "blinding of participants and personnel" in 14 studies, and 17 had an unclear risk of bias, which is due to the nature of the interventions included in this review. One study had a high potential for risk of bias for "blinding of outcome assessment". For all other categories, the risk of bias was either low or unclear due to missing information. The quality appraisal of non-randomized studies also revealed a low overall risk of bias for most studies (Fig. 3).

Outcomes

Most of the included studies (n=48) assessed the cognitive function and BPSD (n=40) of people living with dementia, and 23 studies measured the ADL ability and 15 quality of life of people living with dementia (Table 1).

Instruments

Cognitive functions

Most studies used the MMSE (n=39) to examine the global cognition of people living with dementia, eight studies used the Alzheimer's Disease Assessment Scale-Cognitive Subscale (ADAS-Cog), and three studies each used the Clinical Dementia Rating (CDR) or the narrative language scale. Two studies used the Consortium to establish a Registry for Alzheimer's Disease (CERAD) test battery. Several further instruments were applied in single studies (Table 1).

Behavioral and psychological symptoms of dementia

Many instruments have been used to assess BPSD in patients with different syndromes or symptoms, e.g., the Neuropsychiatric Inventory (NPI, n=14). For depression, the most frequently used instruments were the Geriatric Depression Scale (GDS, n=14) and the Cornell Scale for Depression in Dementia (CSDD, n=10). For agitation, the Cohen-Mansfield agitation inventory (CMA) was most frequently used (n=5). As a general measure, the multidimensional observation scale for elderly subjects (MOSES) was applied in five studies (Table 1).

Quality of life

Regarding quality of life, the most frequently used instrument was the Quality of Life in Alzheimer's Disease scale (QoL-AD), which was applied in 12 of 15 studies assessing the quality of life of people living with dementia (Table 1).

Activities of daily living

Activities of daily living (ADL) were assessed with many different instruments. The Disability Assessment for dementia (DAD) was used most frequently (n=3) (Table 1).

Interventions (Tables S1 and S4)

Intervention categories

We identified eight categories of CS intervention components: reminiscence therapy, cognitive exercises, physical and relaxing exercises, activities of daily living, music, and art therapy, reality orientation, multisensory stimulation, and "other communication intervention" for studies that could not be included in the former categories. Interventions varied considerably between the included studies, comprising different combinations of non-pharmacological interventions and different procedures. The most often included intervention component was reminiscence therapy in 23 studies, followed by cognitive exercises in 18 studies and physical and relaxing exercises in 16 studies. Music therapy and activities of daily living interventions were both applied in 14 studies, and reality orientation and multi-sensory stimulation were applied in ten studies each. "Other communication interventions" were applied in 1 study. On average, the included articles contained interventions with a mean of 2.2 intervention components (range: 1−6) (see Table S4).

Reminiscence therapy

Here, addressing former life events and recalling faces and places were at the center. Some interventions performed reminiscence therapy in groups using triggers such as photographs, household goods, and other familiar items (for washing clothes), a charcoal brazier (for cooking, heating, or cultural rituals), vintage tools, or old textbooks. In other interventions, participants were encouraged to share positive memories in the group. Sessions mostly covered the following topics: childhood and family life; school days; starting work and work life; a day of fun outside the home; marriage; plants and animals; infants and children; food and cooking; holidays and travel; celebrations or eating; family; relationships; etc. One intervention used "eight to nine" photographs and listening to audio to trigger the recall of past life events. In one intervention, small groups performed two activities using specific triggers (music, images, objects, etc.) to evoke participants' memories. The participants then performed a free association exercise consisting of saying or writing the first word or phrase evoked by the stimulus. One intervention involved group reminiscence therapy on the basis of the experiences of participants

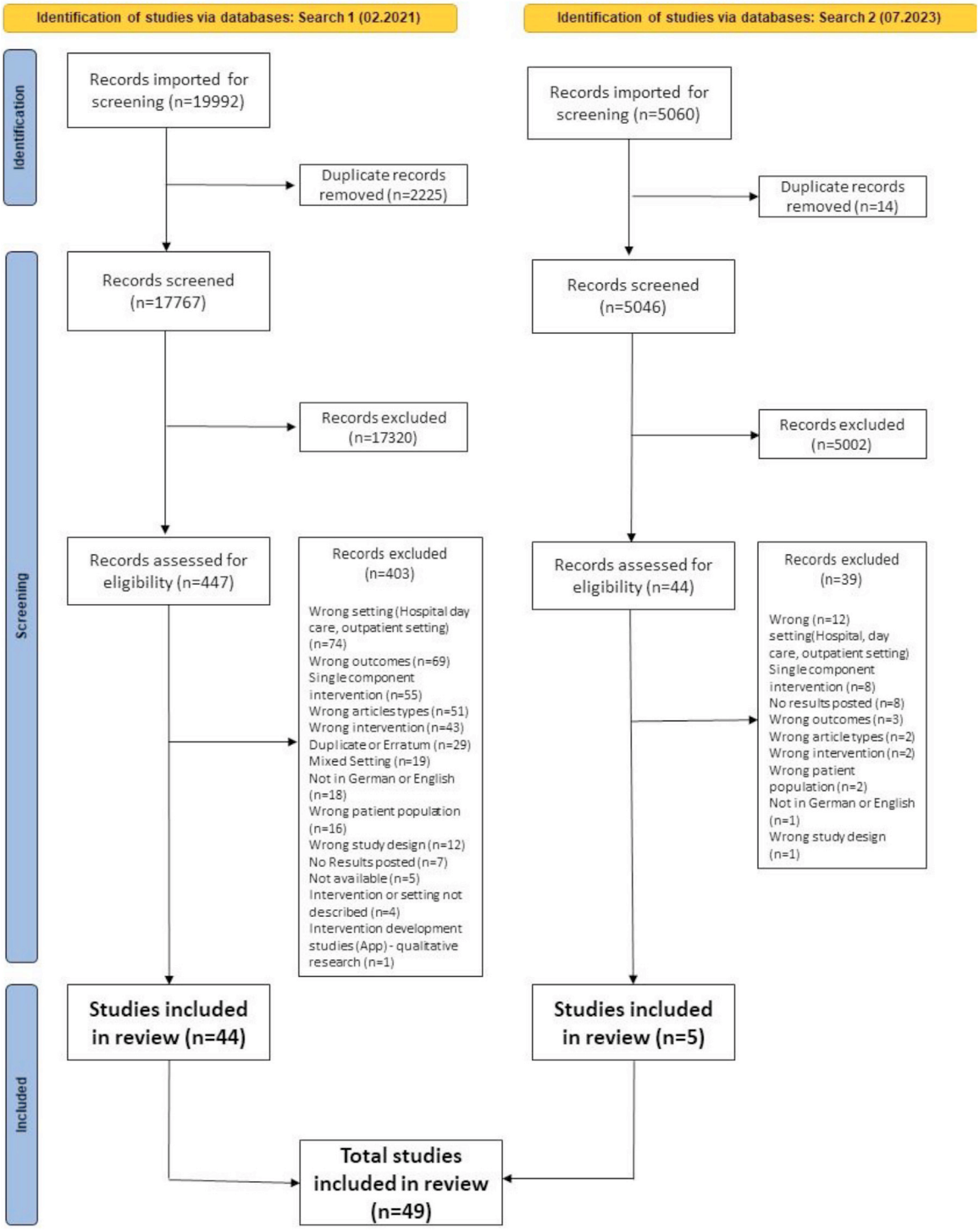

Fig. 1. PRISMA flow diagram.

living with dementia, facilitated by internet-based videos related to the topic of the day. The Sonas intervention included listening to proverbs and poems and looking at interesting household and personal items. One Japanese intervention consisted of making and eating rice balls and cakes ("onigiri" and "ohagi") while reminiscing about events and episodes in the past associated with these activities.

Individual reminiscence therapy was applied in three studies, e.g., speaking about life and reminiscing about faces and places or exploring four different topics—family, profession, holiday, and games—following the SolCos model, which consists of processes facilitating reminiscence therapy. Among the 23 interventions that included reminiscence therapy, 20 were applied in groups, and reminiscing about past life events was addressed most frequently (19 studies) (Table S1).

Cognitive exercises

Various methods of cognitive exercise, such as word associations, categorizing objects, number games, word games, and team games in

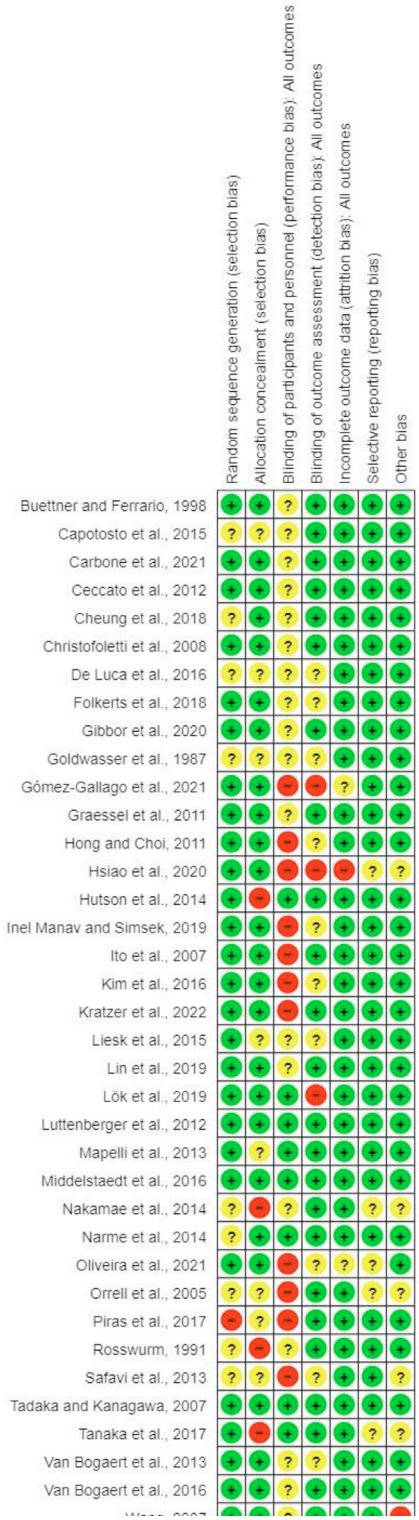

Fig. 2. Summary of the Cochrane risk-of-bias I assessment for randomized controlled trials (n=36).

Note: The symbols "+", "-", and "?" indicate low, high, and unclear risk of bias, respectively

groups and individual settings, have been applied. A variety of approaches have been applied, e.g., matching objects, dividing attention (alternating writing female and male names), moving a series of objects in different directions, or completing picture puzzles combined with web-based cognitive exercises. Another intervention used quizzes, word-association games, and semantic categorization exercises such as category memory games, city map games, meaningful pictures, and sorting cards by color, shape, and number, accompanied by fine motor skills training.

Physical and relaxing exercises

Physical exercises were performed via various methods, such as physical games in groups (15 studies) or individual settings (one study), on a regular daily basis. A daily motor stimulation intervention in groups consisted of light exercises that group members could perform while sitting or standing. Relaxation exercises use breathing methods and upper limb exercises, as well as relaxation exercises accompanied by tasks inspired by established approaches of progressive muscle relaxation and mindfulness.

Music and art therapy

Music therapy has been applied in various ways. One intervention consisted of a progressive series of music sessions and soundtracks. These music sessions could be used in a sequence of systematic exercises about memory. Music therapy was also performed in a group setting, e.g., using a CD player where participants were asked to participate actively by singing and/or by using percussion instruments or by singing folk song canons and instrumentally playing. Sing-along and rhythm bands, song-writing activities, singing together in groups accompanied by the piano, playing elementary musical instruments, or listening to biographically relevant music were also used.

Art therapy was applied in different interventions, e.g., arts and crafts group activities such as painting or drawing. Creative expression was characterized by active participation in the creation of a story, by activities consisting of coloring and hand drawing, or by an art wood sculpting activity led by a professional sculptor.

Activities of daily living

Activities of daily living interventions use various methods, such as speaking in groups about current affairs and using money and guessing prices, or cooking in groups, where participants are asked to make a recipe, following a game about ingredients. In the MAKS therapy program, various daily group activities are performed. One intervention applied activities consisting of sewing, crafting clubs, fingernail grooming groups, resident councils, monthly birthday parties, washing, walking to meals, dressing, etc.

Reality orientation

Reality orientation was applied with participants speaking in groups about orientation and discussing the day, month, year, weather, time, name, and address of the center, as well as current news.

Multi-sensory stimulation

Multi-sensory stimulation was performed via various methods. Stimulation comprised, e.g., working on sound description and categorization, fragrance description and categorization, tactile description, and a visual perception task. Other interventions included listening to music, smelling pleasant scented objects, tasting food, etc., combining activities with tactile, olfactory, or auditory stimulation, or various activities such as air spray fragrance, reading poems, projecting shapes on the wall, playing light music, and performing massages to participants.

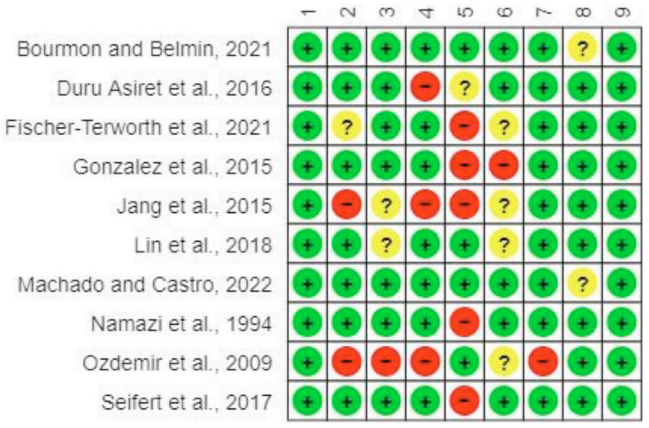

Fig. 3. Summary of the quality appraisal of nonrandomized studies based on the Checklist for Quasi-Experimental Studies (nonrandomized experimental studies),

Note: The symbols "+", "-", and "?" indicate low, high, and unclear risk of bias, respectively

1: Is it clear in the study what is the "cause" and what is the effect (i.e. there is no confusion about which variable comes first?

2: Were the participants included in any comparison similar?

3: Were the participants included in any comparison receiving similar treatment/care, other than the exposure or intervention of interest?

4: Was there a control group?

5: Were there multiple measurements of the outcome both pre and post the intervention/exposure?

6:Was follow-up complete and if not, were differences between groups in terms of their follow-up adequately described and analyzed?

7: Were the outcomes of participants included in any comparison measured in the same way?

8: Were outcomes measured in a reliable way?

9: Was appropriate statistical analysis used?

Other communication interventions: visual structuring and clear communication

One intervention component was categorized as "other," applying visual structuring and clear communication with residents. Visual structuring refers to using diagrams and charts to organize and simplify complex information, making it easier to understand and remember. Clear communication involves conveying messages in a simple, precise, and understandable way, ensuring that information is accurately shared and reducing misunderstandings.

Description of interventions based on TIDieR

Below, a summary of intervention descriptions based on TIDieR is presented; see Table S1 for the full results.

Procedures

All of the included studies applied complex interventions. Nearly all followed an organized and structured framework to provide the intervention. For all of the interventions, n=19 stated the use of a manual or were manual-based.

Rationale and theoretical basis of the interventions

None of the studies explicitly stated an underlying theory, but they were all based on previous research and were structured and scientifically based interventions.

Materials

Most of the studies mentioned the use of personal items of people living with dementia, such as pictures or everyday life items. Studies applying music therapy used musical instruments or any equipment to listen to music. Studies that focused on cooking used materials for the kitchen and diverse ingredients. One study, which focused on sculpting, used wood blocks. Four studies did not report the use of material. One study mentioned the use of teaching materials for nursing staff. None of the studies reported details about the content, scope, or protocols concerning the use of the materials.

Mode of delivery

In 39 studies, the intervention was carried out in group sessions, whereas in eight studies, the intervention was delivered in individual sessions, one used a mixture of individual and group activities, and one study provided no information.

Intervention provider

In 13 studies, an interdisciplinary team or trained operators or facilitators delivered the intervention, whereas the investigator or a member of the research team in nine studies conducted the intervention. In the remaining studies, the intervention providers were psychologists or therapists (n=4 studies), registered geriatric nurses (n=2), professional music therapists (n=2), professional sculptors (n=1), staff members (n=2), or nursing home staff qualified to conduct the study (n=1). Four studies did not report who was in charge of providing the intervention.

Intervention period

The mean intervention duration was 15 weeks (SD: 10,77), ranging from three to 52 weeks. The number of sessions ranged from four to 364 sessions for the entire intervention. One study did not report the intervention period. The mean intervention duration was 2304 min (38 h), ranging from 240 to 37,440 min (4–624 h).

Description of the interventions based on the CReDECI 2 criteria

A comprehensive description of complex intervention studies reported on the basis of the CReDECI 2 criteria is presented in Fig. S1, and the results are briefly summarized below.

Intervention development (items 1 to 4)

All included studies described a theoretical background for the interventions (item 1), and almost all described the aims and essential functions of the intervention components (n=37) (item 2). More than half of the studies (n=29) described intended interactions between components (item 3) and considerations of the context's characteristics (item 4) (n=30).

Intervention feasibility and piloting (item 5)

Very few studies described pilot testing and the impact that the pilot study had on the intervention (n=6). For some studies, this item was not applicable, as the studies themselves were labelled pilot studies (n=12). For less than one-third of the studies (n=15), this item was not fulfilled, as no description of the pilot test and its impact on the definition of intervention was provided. For more than a third of the studies (n=16), this item was partially fulfilled, as a pilot study was mentioned without further explanation or a theory or literature basis was reported, without providing any information on how this was adapted into the studies.

Intervention evaluation (items 6 to 13)

Nearly all studies described the control condition (n=38, item 6), reported the strategy for delivering the intervention within the study context (n=37, item 7), and reported the items concerning the materials and tools used to deliver the intervention (n=41, item 8). Only one study provided information about a study protocol, but none focused on the fidelity between the intervention and the study protocol (item 9). A process evaluation was only conducted in a few cases, as most of the studies did not (n=44) or only partially (n=5) fulfil the

Table 1
Characteristics of the included studies

Source Country N	Intervention type	Objective	Design	Inclusion (cognition)	Participants	Intervention *Frequency & duration* *Total therapy minutes*	Intervention period, Follow-up	Outcomes & instruments	Main findings
*Bourdon, Belmin [35] France N=120 IG1: 40 IG2:41 CG: 39	Multisensory stimulation	To determine the effectiveness of enrichment applied to gardens in nursing homes.	▫ Cluster-controlled Trial	Inclusion ▫ Alzheimer's Disease or another type of dementia ▫ Capable of walking independently with no human help ▫ No severe behavioral problems ▫ MSE score sup/egal 10	Age (mean years) IG1: 80.9; IG2: 80.5; CG: 81.1 Sex (female; %) IG1: 72%; IG2: 68% CG: 67% MMSE IG1: 18.0; IG2: 17.8 (2.9) CG: 17.3 (3.3)	IG1: Enriched garden visit: 4 visits a week à 10−20 min for 6 months IG2: Conventional garden visit: 4 visits a week à 10−20 min for 6 months CG1: No specific invitation to visit the garden 360 min	Intervention period: 24 weeks ▫ Pre-post intervention assessment	Cognitive function ▫ MMSE ADL ▫ Independence for ADL	MMSE Score of the IG1 showed improvement after the intervention in comparison with the other two groups. Regarding ADLs, the IG1 showed significant improvement after the intervention in comparison with the other two groups.
Buettner and Ferrario, [36] USA N=66 IG:33 CG:33	Therapeutic recreation-nursing intervention	To design, implement, and evaluate an interdisciplinary program of activities based on the PlwD	▫ RCT	*Inclusion* ▫ Not being on the medication Tacrine ▫ Being stable on other medications	*Age* (mean years): 86.2 (54-100) *Sex* (female; %): 87.9% *MMSE* 7.5 (0-19)	IG: 2 times weekly for 45 min for over 30 weeks 2700 min	Intervention period: 30 weeks ▫ Baseline assessment ▫ T0= 10th week ▫ T1=20th week ▫ T2= 30th week	Cognitive function ▫ MMSE BPSD ▫ CMAI ▫ GDS ▫ MOSES ADL■ Timed Manual Performance■ Modified Wells-Sit-and-Reach test	Over time and group, analysis improvements in all of the outcomes were observed after the intervention.
Capotosto et al., [37] Italy N= 39 IG:20 CG:19	Cognitive stimulation therapy	To examine the efficacy of the Italian version of cognitive stimulation therapy	▫ RCT	*Inclusion* ▫ Diagnosis of dementia ▫ MMSE ≥14 ▫ CDR: 1 to 2 ▫ Satisfactory ability to understand and communicate ▫ No learning disability	*Age* (mean years): IG: 88.25; CG: 86.52 *Sex* (female; %) : IG: 75%; CG: 63.2% *MMSE* IG: 18.30 (3.14); CG: 18.20 (3.63)	IG: 14 sessions twice a week for 7 weeks 630 min	Intervention period: 7 weeks ▫ Pre/post- post-intervention assessment; ▫ First session: pre-intervention assessment ▫ Last sessions: post-intervention assessment	Cognitive function ▫ MMSE ▫ ADAS-Cog ▫ Backwards digit span test ▫ Narrative language test BPSD ▫ CSDD ▫ Social and emotional loneliness scale ▫ NPI ADL ▫ DAD Quality of life ▫ QoL-AD	Improvements were observed in cognitive functions, quality of life, and BPSD in the intervention group after the intervention.
Carbone et al. [38] Italy *N=225* *IG: n= 123* *CG: n= 102*	Cognitive Stimulation Therapy	To examine the efficacy of the treatment and 3 months afterward of an Italian adjustment of the CST	▫ RCT	Inclusion criteria: ▫ a diagnosis of major neurocognitive disorder (of any etiological subtype) according to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders in the mild-to-moderate range, that is, MMSE score ≥14 ▫ CDR score: 1 to 2 ▫ a satisfactory ability to understand and communicate	*Age* (mean years): *IG: 82.57;* *CG: 84.74* *Sex* (female; %) *IG: 69%; CG: 63%* *MMSE* *IG: 20.17; CG: 19.90 (3.92)*	IG:20 sessions over a period of 23 weeks for 45 min per session ▫ 900 minutes CG:Twice a week for 7 weeks, typical educational activities were promoted by the residential care homes involved in the study.	Intervention period: 23 weeks ▫ Follow-up: 3 months	Cognitive function ▫ MMSE ▫ ADAS-Cog ▫ Narrative Language Test BPSD ▫ CSDD ▫ NPI ADL ▫ DAD Quality of life ▫ QoL-AD	Improvements in cognitive functions and BPSD were observed in the intervention group post-intervention.
Ceccato et al. [39] Italy N=51 IG: 28 CG: 23	Sound Training for Attention and Memory in Dementia (STAM-Dem)	Evaluation of the efficacy of the application of the Sound Training for Attention and Memory (STAM-Dem) on symptomatic, cognitive, behavioral, and emotional manifestations present in PlwD	▫ RCT	*Inclusion* ▫ MMSE score: 12-24 ▫ Clinical condition established at least 15 days before identification ▫ Age > 65 years ▫ Sensitive to sound/musical stimuli ▫ communicative and relation skills ▫ No current delirium or psychosis	*Age* (mean years): IG: 85.5; CG: 87.2 *Sex (female; %)* IG: 77.8%; CG:82.6% *MMSE* IG:16.93; CG:16.39	IG: Two weekly sessions of 45 min over a period of 12 weeks, 24 sessions of 45 min 1080 min	Intervention period: 12 weeks ▫ Pre/post intervention assessment ▫ No follow-up	Cognitive function ▫ MMSE ▫ Attentional matrices ▫ Forward and reverse digit-span exercise ▫ Immediate and Deferred Prose Memory Test BPSD ▫ CMAI ▫ GDS ADL ▫ IADL	Improvements in cognitive functions and activities of daily living were observed post-intervention in the intervention group.
Cheung et al., [40] Hong-Kong N= 165 IG (Music with Movement MM): 58 CG1 (music listening ML): 54 CG2 (social activity): 53	Music-with-movement intervention for people with moderate dementia	Evaluation of the effectiveness of an evidence-based music-with-movement (MM) intervention, compared to two other interventions: music listening (ML) and social activity (SA) on the cognitive functions of Plwd in nursing homes.	▫ RCT	*Inclusion* ▫ Age ≥ 65 ▫ Diagnosis of any type of dementia ▫ GDS score: 5 to 6 ▫ Stable medical condition	*Age (mean years):* IG: 85.71; CG1: 84.50 (6.82); CG2: 85.58 (7.46) *Sex (female; %)* IG: 47.1%; CG1: 77.8%; CG2: 75.5% *MMSE* IG: 10.99; CG1: 12.12; CG2: 11.97	IG1 (MM): twice a week for 6 weeks; 30 min 360 min	Intervention period:12 weeks ▫ T0: baseline ▫ T1: 6th week (immediately post-intervention) ▫ Follow up: 6 weeks post-intervention	Cognitive Function ▫ MMSE ▫ FOME ▫ MVFT ▫ DST BPSD ▫ RAID Scale ▫ GDS	Significant improvements were observed in the cognitive functions and the BPSD of the intervention group post-intervention.
Christofoletti et al., [41] Brazil N= 54 IG: 17 CG1 : 17 CG2 : 20	Motor intervention on balance and cognition in PlwD	To analyse the adequacy of two intercessions on the cognitive capacities of institutionalized elderly individuals with dementia	▫ Longitudinal RCT	*Inclusion* ▫ Dementia ▫ No other neurological diagnosis or neuropsychiatric conditions associated with cognitive impairment	*Age (mean years):* IG: 70.0; CG1: 72.9; CG2: 79.4 *Sex (female; %)* IG: 64.7%; CG1: 70.6%; CG2: 70% *MMSE*	IG: 5 times a week, 2 h per day over 6 months CG1: three times a week, one hour per day over 6 months 14 400 min	Intervention period: 24 weeks ▫ Baseline and 6 months later (intervention/follow-up)	Cognitive function: ▫ MMSE ▫ Brief Cognitive Screening Battery ADL ▫ 14-item Berg Balance Scale ▫ Timed Get-Up-and-Go	Improvements in activities of daily living were observed in the intervention group post-intervention.

(*continued on next page*)

Table 1 (*Continued*)

Source Country N	Intervention type	Objective	Design	Inclusion (cognition)	Participants	Intervention *Frequency & duration* *Total therapy minutes*	Intervention period, Follow-up	Outcomes & instruments	Main findings
					IG: 18.7; CG1: 12.7; CG2: 14.6				
De Luca et al.[42] Italy N=20 IG: n= 10 CG: n= 10	Web-based cognitive exercises for PlwD	To assess the viability of combined web-based exercises in PlwD	▫ RCT	Inclusion ▫ mild to moderate cognitive decline ▫ vascular lesions at CT scan ▫ the absence of concomitant visual, auditory, and behavioral problems interfering with the training	*Age (mean years):* *IG: 78.0; CG: 77.8* *Sex (female; %)* *IG:50%; CG:50%* *MMSE* *IG:24.5; CG:25.8*	IG: 24 sessions of web-based PC cognitive exercises, three times weekly for 8 weeks, in addition to standard neurorehabilitation (CCT); each cognitive rehabilitative session was administered for at least 45 min, depending on the degree of the patient's ability. 1080 min	Intervention period: 8 weeks ▫ T0 baseline pre ▫ T1 post	Cognitive function ▫ MMSE ▫ CVF ▫ LVF ▫ AM ▫ CA ▫ BANSS BPSD ▫ BPRS ▫ GDS ADL ▫ Basic activities of daily living (ADL) ▫ IADL	Cognitive functions were improved post-intervention in the intervention group as the depression mood.)
Duru Asiret et al.,[43] Turkey N= 62 IG: 31 CG: 31	Reminiscence therapy for people with Alzheimer disease	To assess the adequacy of memory treatment on the cognitive capacities, discouragement, and everyday living abilities of PlwD	▫ Quasiexperimental post hoc	*Inclusion* ▫ Age ≥ 65 ▫ Diagnosis of AD ▫ sMMSE score: 10-24 ▫ ability to communicate and verbal language ▫ Ability to actively participate in group interactions	*Age (mean years):* IG: 81.83; CG: 82.26 *Sex (female; %)* IG: 67.7%; CG: 67.7% *MMSE* IG: 15.65; CG: 14.16	IG: 1 sessions per week for a total of 12 weeks. Each session lasted 30 to 45 min 450 min	Intervention period: 12 weeks ▫ Assessment pre/post-intervention	Cognitive Function ▫ sMMSE BPSD ▫ GDS ADL ▫ Descriptive information form ▫ The Daily Living Activities Observation Form	Improvement in the cognitive functions and the mood of the participants in the intervention group post-intervention.
Fischer-Terworth and Probst[44] Germany N= 49 IG:26 CG: 23	TEACCH- and Music Therapy-Based Psychological Intervention in for PlwD	To assess the impacts of TMI (music treatment-based intercessions) in a controlled plan based on the comparison of a mediation group (IG) with a control group (CG)	▫ Controlled trial	*Inclusion* ▫ Mild or moderate dementia of Alzheimer's type, mixed or unknown ▫ MMST score: 9-24 ▫ GDS level: 3-6	*Age (mean years):* IG: 81.6; CG: 85.8 *Sex (female; %)* IG:88.5%; CG:87% *MMST* IG:16.1; CG:17.6	IG: Music-based group therapy: Once a week for the residents Structured teaching: once a week for 45 min (time-related structuring) Psychoeducational staff training: 12 lessons Intensive family member-staff communication CG: nonspecific occupational therapy 1080 min	Intervention period: 24 weeks ■ Pre: T0 ■ Post: T1 after 6 months of the intervention	Cognitive function ▫ MMST BPSD ▫ GDS ▫ NPI ADL ▫ ICEA-D	Improvements were observed in the BPSD and the activities of daily living of the participants in the intervention group post-intervention.
Folkerts et al.[45] Netherlands N = 12: IG: n = 6 CG: n = 6	Cognitive Stimulation for PlwPD	To evaluate the feasibility and potential effects of cognitive stimulation in Parkinson's disease dementia	▫ RCT	Inclusion: ▫ being a resident in the PD Care unit ▫ idiopathic PD diagnosed by a neurologist or psychiatrist ▫ MMSE score: 10 to 25 ▫ Dutch as the native language or very good Dutch language Skills	*Age (mean years):* IG:76.67; CG:76.50 *Sex (female; %)* IG:17%; CG:17% MMSE IG:17.50; CG:18.17	IG: Over a period of eight weeks, twice per week for 60 min. Cognitive exercises targeting executive and visual-spatial functions → fine motor skills training 360 min CG: PD unit care	Intervention period: 8 weeks ▫ Group A: Pre-post intervention + 6 weeks usual care + follow up 8 weeks CS + 6 weeks UC (usual care) + Follow up ▫ Group B: Preintervention + usual care + test + intervention + post-intervention + usual care + follow up 8 weeks UC + 8 weeks CS + 6 weeks UC + Follow up	Cognitive function: ▫ CERAD test battery + word fluency test and trail-making test ▫ Clock Drawing test BPSD: ▫ NPI ADL: ▫ Barthel Index Quality of life: ▫ EQ-5D-5 L ▫ QUALIDEM	Improvements in global cognition and neuropsychiatric symptoms in the intervention group post-intervention.
Gibbor et al.[46] Great Britain N= 33 IG: 16 CG: 16	Cognitive stimulation therapy for dementia	To evaluate the feasibility of an individual cognitive stimulation intervention (CST) for PlwD	▫ RCT	*Inclusion*Diagnostic of dementia ▫ MMSE Score ≥ 10 ▫ be able to communicate, understand, see, and hear well enough to participate in activities as part of CST	*Age (mean years):* IG:86.24; CG:77.19 *Sex (female; %)* IG:42.9%; CG:66.7% *SMMSE* IG:20.94; CG:22.50	IG: Two 45-minute sessions a week. Over 7 weeks. 14-sessions of CST 630 min	Intervention period: 7 weeks Assessment preintervention and follow-up assessment on average within 10 weeks of baseline assessment	*Cognitive function* ▫ SMMSE ▫ ADAS-Cog *Quality of life* ▫ QoL-AD	Partly improvement of the cognitive functions in the ADAS-Cog in the intervention group post-intervention.
Goldwasser et al.,[47] USA N= 30 Group 1 (IG): 10 Group 2 (SG): 10 Group 3 (CG): 10	Reminiscence group therapy for PlwD	To examine the viability of memory treatment in comparison to a fake treatment gather and control bunch on cognitive capacities and the temperament and ADL of PlwD	▫ RCT	*Inclusion* ▫ Diagnosis of dementia ▫ Symptoms associated with dementia (confusion, disorientation, cognitive dysfunction) ▫ Ability to communicate verbally	*Age (mean years):* IG:81.6;SG:83.1;CG:83.1 *Sex (female; %)* IG:77.8% SG:77.8% CG:66.7% *MMS score* IG:10.7 SG:9.4 CG:10.2	IG: 30 min two times per week over 5 weeks 300 min SG: 30 min two times per week over 5 weeks 300 min CG: No treatment for 5 weeks	Intervention period: 5 weeks Assessments were done before treatment, immediately after, and at five weeks post-treatment one week before the intervention, One week after the intervention, and finally, five weeks after termination.	*Cognitive function* ▫ MMS *BPSD* ▫ BDI *ADL* ▫ Katz Index of Activities of Daily	Light improvement in the activities of daily living in the intervention group post-intervention.
*Gómez-Gallego, Gómez-Gallego, Gallego-Mellado, García-García[48] Spain N=90 IG1: 28 IG2: 21 CG: 41	Music therapy and Cognitive exercises	To compare the effects of two types of group and preferred music-based interventions (active and receptive) with a control activity on cognition, behavior, motor function, and abilities.	▫ Cluster RCT	Inclusion ▫ Diagnosis of probable AD ▫ Mild or moderate stage of dementia	*Age (mean years):* IG1: 83.93; IG2: 78.67; CG: 80.02 *Sex (female; %)* IG1: 71.5% IG2: 61.9% CG: 54.5% MMSE IG1: 17.79; 18.28; CG: 19.95	IG1: Active music intervention 45 min twice a week for three months (12 sessions in total) IG2: Receptive music intervention 45 min twice a week for three months (12 sessions in total) CG: care as usual 540 mintes	Intervention period: 12 weeks Pre-Post intervention assessment	Cognitive function ▫ MMSE BPSD ▫ NPI ▫ GDS ADL ▫ Barthel-Index	IG1 showed significant improvement between baseline and follow-up for cognition, BPSD, and ADL, and IG2 demonstrated significant improvement between baseline and follow-up for cognition and ADL.

(*continued on next page*)

Table 1 (*Continued*)

Source Country N	Intervention type	Objective	Design	Inclusion (cognition)	Participants	Intervention *Frequency & duration* *Total therapy minutes*	Intervention period, Follow-up	Outcomes & instruments	Main findings
Gonzalez et al.[49] Spain N= 42 IG: 23 CG: 19	Reminiscence therapy for PlwD	To test the effectiveness and the benefits of an integrative reminiscence program for PlwD	▫ Quasiexperimental design	*Inclusion* ▫ Diagnosis of AD ▫ MMSE score ≥ 23 ▫ impairment in the neuropsychological examinations ▫ No speech or vision disorders ▫ GDS level: 3 to 4	*Age (mean years):* IG:80.35; CG:80.63 *Sex (female; %):* IG:60.9%; CG:78.9% *MMSE* IG: 19.6; CG:20.3	IG: 10 weekly sessions for 60 min each 600 min	Intervention period: 10 weeks Pretreatment assessments were performed two weeks before the beginning of the intervention Posttreatment assessments were performed immediately after the intervention	Cognitive function ▫ MMSE BPSD ▫ CES-D ▫ RSES ▫ Ryff Psychological Well-being scales	Improvements were observed in the BPSD of the participants in the intervention group regarding the well-being of the participants and the depressive symptoms.
Graessel et al.[50] Germany N= 98 IG: 50 CG: 48	Multicomponent group therapy for PlwD	To determine the effectiveness of the MAKS intervention on cognitive functions and ADL for PlwD	▫ Longitudinal RCT	*Inclusion* ▫ Primary degenerative dementia according to ICD-10 and confirmed by physician ▫ MMSE score < 24	*Age (mean years):* IG:84.5; CG:85.7 *Sex (female; %):* IG:88%; CG:78.3% *MMSE* IG:15.4; CG:13.8	IG: 2 h for 6 days a week over a period of 12 months 34 560 min CG: usual care	Intervention period: 54 weeks T0: at baseline T1: 12 months later	Cognitive function ▫ ADAS-Cog ADLs' abilities ▫ E-ADL Test	At follow-up cognitive functions and activities of daily living remained stable In the intervention group whereas these outcomes decreased in the control group.
Hong and Choi[51] Korea N= 30 IG:15 CG: 15	Songwriting oriented activities for PlwD	To test, the efficacy of a music therapy program employing songwriting-oriented activities, on cognitive functions of PlwD	▫ RCT	*Inclusion*Non reported but the description of the sample ▫ elderly people ▫ housed in a nursing home ▫ who had already been medically diagnosed with dementia	*Age (mean years):*78.3 *Sex (female; %):* 93.3% *MMSE* IG: 14.0; CG: 15.00	IG: 60 min per week for 16 weeks 960 min	Intervention period: 16 weeks T0: two weeks before Intervention T1: one week after intervention	Cognitive function ▫ MMSE-K	Improvements in cognitive functions were observed in the intervention group post-intervention.
Hsiao et al.[52] Taiwan N= 72 IG1:24 IG2:24 CG:24	Reminiscence therapy for PlwD	To explore the effects of art therapy and reminiscence therapy in agitated behavior in PlwD	▫ True experimental research design	*Inclusion* ▫ Diagnosis of dementia ▫ Age ≥ 55 ▫ MMSE score ≥ 6 ▫ No severe visual, hearing, or upper limb disabilities ▫ To be able to communicate in Taiwanese	*Age (mean years):* 64.8% ≥ 80 years *Sex (female; %):* 64.8% *MMSE* Average score: 15.7 points	IG1: Art therapy group IG2: reminiscence therapy Weekly sessions of 50 min over 12 weeks 600 min	Intervention period: 12 weeks T0: before intervention T1: 1 week after the intervention T2: 6 weeks after the intervention	Cognitive function ▫ MMSE BPSD ▫ CMAI	Significant differences were found in agitated behavior symptoms in the intervention group post-intervention.
Hutson et al.,[53] United Kingdom N= 39 IG: 21 CG: 18	Sona's intervention for PlwD	To investigate the improvement of depression anxiety, behavioral disturbance, communication, and QoL for PlwD and to test the feasibility of the Sonas intervention	▫ RCT	*Inclusion* ▫ Diagnosis of Dementia (DSM-IV) ▫ MMSE score: 0 to 17	*Age (mean years):* IG: 86.6; CG: non reported *Sex (female; %):* IG: 86.1%; CG: non reported *MMSE* IG: 4.9 (SD: 5.2) CG: non reported	IG: Group session 14 Sonas sessions over a 7 to 8-week period. The sessions lasted for approx. 45 min to 1 h. 735 min	Intervention period: 7 – 8 weeks Baseline: 1 to 2 weeks before the intervention Follow-up: 1 week after the intervention	BPSD ▫ RAID ▫ CSDD ▫ NPI ▫ Holden communication Scale Quality of Life ▫ QoL-AD	The Sonas intervention did not show any improvements in any of the outcomes.
Inel Manav and Simsek[54] Turkey N= 32 IG: 16 CG: 16	Reminiscence therapy with Internet-based videos for PlwD	To assess the effects of reminiscence therapy that was supported with internet-based videos on the cognitive condition and apathy levels of PlwD	▫ RCT	*Inclusion* ▫ Age ≥ 65 ▫ Diagnosis of Alzheimer's type of dementia ▫ MMSE score: 18-24	*Age (mean years):*IG: 74.06; CG: 74.81*Sex (female; %):* IG: 43.8%;CG: 43.8%*MMSE* ▫ IG: 21.69 (1.14) ▫ CG: 21.44 (1.09)	IG: 60 min once a week for 3 months 720 min CG: unstructured casual interviews in subgroups of 8 in 25-30-minute sessions once a week	Intervention period: 12 weeks Pre/post-intervention assessment	Cognitive function ▫ SMMSE BPSD ▫ Apathy Rating Scale	Improvements in cognitive functions and BPSD were observed in the intervention group post-intervention.
Ito et al.[55] Japan N= 60 IG1: 20 IG2: 20 CG: 20	Group Reminiscence Approach	To assess the advantageous impact of the gather memory approach (GRA; IG1) in patients with vascular dementia on cognitive and behavioral capacities compared to a social contact group (SC, IG2) and a control group (CG).	▫ RCT	*Inclusion* ▫ Diagnostic of ischemic VaD of ADDTC ▫ MMSE score: 10-24	*Age (mean years):* IG1: 82.9; IG2: 81.9; CG: 82.1; *Sex (female; %):* IG1: 55.6%; IG2: 68.75%; CG: 76.5% *MMSE* IG1: 15.8; IG2: 16.6; CG: 15.4	IG1 (GRA): Once a week for 3 months for 1 h 720 min IG2 (SC): 1 h session once a week for 3 months 720 min	Intervention period: 12 weeks Pre/post- intervention assessment	Cognitive function ▫ MMSE ▫ CASI BPSD ▫ MOSES	No significant improvement was observed in the different outcomes regarding the cognitive functions or the BPSD of the nursing residents participating in the study.
Jang et al.[56] *Korea* *N = 29* *VD: 22* *AD: 7*	Spaced retrieval training with errorless learning in the rehabilitation of PlwD	To examine the effects of spaced retrieval training (SRT) with errorless learning (EL) for the rehabilitation of PlwD	▫ Controlled trial	*Inclusion:* ▫ participants with VD ▫ participants with AD	*Age (mean years):* VD: 58.9; AD: 78.1 *Sex (female; %):* VD: 29% AD: 71% *MMSE* VD: 15.7 AD: 9.2	IG: SRT with errorless learning (EL) 30 in., 7x/week, 5 weeks 1050 min	Intervention period 5 weeks ▫ Postassessment after 5 weeks from baseline ▫ no further follow-up assessments	*Cognitive function* ▫ CERAD-Korean BPSD ▫ GDS-Korean ADL ▫ Modified Barthel Index	Improvements in cognitive functions and depressive symptoms (BPSD) were observed.
Kim et al.[57] South-Korea N = 33 IG: 19 CG: 19	Physical exercise with multicomponent cognitive intervention for people with AD	To test the effectiveness of a 6-month physical exercise with a complex cognitive Program (MCP) on the	▫ RCT	*Inclusion:* ▫ diagnosis of moderate to severe AD ▫ MMSE score of ≤ 20	*Age (mean years):* IG: 81.9 CG: 80.9 Sex (female; %): IG: 68.4%; CG: 85.7%	IG: KEP: 60 min supervised exercise session 5 times per week for 6 months. MCP: 60 Min. per session twice a day, 5 days per week for 6 months	Intervention period: 24 weeks ▫ Pre/postassessment	Cognitive function: ▫ ADAS-cog ▫ MMSE ▫ Clock Draw	No improvements were observed in all cognitive measures for cognitive functions.

(*continued on next page*)

Table 1 (*Continued*)

Source Country N	Intervention type	Objective	Design	Inclusion (cognition)	Participants	Intervention *Frequency & duration* *Total therapy minutes*	Intervention period, Follow-up	Outcomes & instruments	Main findings
		cognitive functions of people with AD				7200 utes CG: Single MCP 60 Min. per session twice a day, 5 days per week for 6 month 14 400 min			
*Kratzer, Diehl, Gefeller, Meyer, Graessel [58] Germany N=152 IG: 60 CG: 61	MAKS-intervention	Evaluation of possible effects of the MAKS-s intervention	▫ Cluster-RCT	Inclusion ▫ severe dementia ▫ MMSE score: 0 to 9	*Age (mean years):* IG: 85.00 CG: 84.25 Sex (female; %): IG: 76.6% CG: 75.4% MMSE IG: 5.12 CG: 4.34	IG: Multicomponent group intervention consisting of four elements (MAKS-s) each session lasted 1 h, three sessions per week for a 6-month interventionCG: Care as usual ▫ 4320 min	Intervention period: 6 months Pre-Post intervention assessment	Cognitive function ▫ MMSE BPSD ▫ NPI-NH ADL ▫ ADCS-ADL Quality of lifeQUALIDEM	No intervention effect observed
Liesk et al. [59] Germany N = 24 IG1: 12 IG2: 12	Cognitive stimulation and music intervention for PlwD	To evaluate the effects of a cognitive stimulation program and a music intervention program on cognitive function, quality of life, and activities of daily living in PlwD	▫ RCT	Inclusion: ▫ mild to moderate dementia	*Age (mean years):* *IG1: 84.3* *IG2: 83.6* Sex (female; %): *IG 1: 92%* *IG2: 92%* *MMSE* *IG1: 19.7* *IG2: 20.1*	IG: 90 min, 2x/week, 6 weeks 1080 min active CG: Music therapy (singing folk songs and canons and playing instruments)) 90 min, 2x/week, 6 weeks 1080 min	Intervention period: 6 weeks ▫ Postassessment after 6 weeks from baseline ▫ no further follow-up assessments	Cognitive function: ▫ MMSE ▫ Demtect ADL ▫ Barthel-Index Quality of life ▫ DEMQOL	No significant improvements in the different outcomes were observed.
Lin et al. [60] Taiwan N= 105 IG1: 43 IG2: 30 CG: 32	Cognitive stimulation and reminiscence therapy for PlwD	To investigate the effects of CST and RT on cognitive functions, and quality of life for PlwD	▫ Quasiexperimental study	*Inclusion* ▫ Elderly residents ▫ MMSE score <17 for those with an education below senior high school ▫ MMSE score < 24 for those with an education above high school ▫ Agitated or depressive symptoms in the last 2 weeks	*Age (mean years):* IG1: 78.7 IG2: 79.1 CG: 80,8 *Sex (female; %):* IG1: 67.4% IG2: 63.3% CG: 56.2% *MMSE* IG1: 13.5 IG2: 15. CG: 14.5	IG1 & 2: 50 min once a week for 10 continuous weeks 500 min CG: regular activities	Intervention period: 10 weeks ▫ Pre-Test: Week 1 ▫ Posttest: Week 12 ▫ Follow-up: Week 24	Cognitive function ▫ MMSE BPSD ▫ Classification Form of BPSD in PlwD developed by Wang Quality of life ▫ QOL-AD	Improvements in cognitive functions and quality of life were observed in the intervention groups.
Lin et al. [61] China N= 91 IG: 43 CG: 48	Creative Expression Therapy on Chinese PlwD	To evaluate the effectiveness of creative expression (CE) therapy on cognition, communication, emotion, and quality of life in PlwD	▫ Prospective non-blinded RCT	*Inclusion* ▫ Age ≥ 65 ▫ Diagnosis of dementia ▫ MMSE Score: 11-27	*Age (mean years):* IG: 85.3; CG: 83,46 *Sex (female; %):* IG: 55,8%; CG: 68,8% *MMSE* IG: 18,72; CG: 18,40	IG: Twice a week, 60 min each for 6 weeks 720 min	Intervention period: 6 weeks ▫ Assessment at baseline, 1- and 4- weeks post-intervention ▫ For the OERS assessments were done during the intervention period at weeks 3 and 6 ▫ 1-month follow-up	Cognitive Function ▫ MMSE BPSD ▫ CSDD ▫ FACS ▫ OERS Quality of Life ▫ QoL-AD	The participants showed improvements in cognitive function, quality of life, depression degree, communication ability, and emotional status in the intervention group.
Lök et al. [62] Turkey N= 60 IG: 30 CG: 30	Reminiscence for people with AD	To test the effectiveness of reminiscence therapy on cognitive functions, depression, and quality of life in people with AD	▫ RCT	*Inclusion* ▫ Diagnosis of AD ▫ sMMSE score:13-24 ▫ Score on the CSDD ≥ 8 or higher	*Age (mean years):* IG: nonreported CG: not reported *Sex (female; %):* IG: 60%; CG: 53.4% *sMMSE* IG: 18.26; CG: 18.83	IG: The intervention took place every week for 60 min over a period of 8 weeks 480 min	Intervention period: 8 weeks ▫ Assessment pre/post- intervention ▫ No post-intervention follow−up	Cognitive function ▫ sMMSE BPSD ▫ CSDD Quality of life ▫ QoL-AD	Improvements in cognitive functions, mood, and quality of life in the intervention group were observed.
Luttenberger et al. [63] Germany N = 52 IG = 30 CG = 22	Cognitive Stimulation for PlwD	To demonstrate the effectiveness of a multimodal activation therapy developed for PlwD and examine the sustainability of the effects of a non-drug therapy in PlwD	▫ Longitudinal RCT	*Inclusion* ▫ Primary degenerative dementia according to ICD-10 ▫ MMSE score < 24	*Age (mean years):* IG: 84.1; CG: 84.64 *Sex (female; %):* IG: 90%: CG: 72.7% MMSE: IG: 15.9; IG: 14.4	IG: Each session took place from Monday to Saturday from 09:30 am to 11:30 am for 12 months 37 440 min	Intervention period: 54 weeks ▫ T0: Baseline ▫ T1: at the end of therapy − 12th month ▫ T2: 10 months after the end of the therapy − 22nd month	Cognitive function ▫ ADAS-Cog ADL ▫ E-ADL Test ▫ NOSGER	After the end of therapy, both the control and the MAKS groups deteriorated in both their cognitive function and their ability to carry out ADLs. The ability of the MAKS group to perform ADLs remained significantly higher than that of the control group even 10 months after the end of therapy
*Machado, Castro [64] Brazil N=20 IG=10 CG=10	Individual Multisensory stimulation	To investigate the effects of MSSP on behavioral, mood, and biomedical parameters of older adults with moderate and severe dementia compared to a CG not submitted to this program.	▫ quasiexperimental clinical trial	Inclusion ▫ Age > 65 years ▫ Diagnosis of Dementia (AD, VD, other types) ▫ MMSE score < 26 for people with more than 8 years of education, ▫ MMSE score <18 points for 1-7 years of education ▫ MMSE score < 13 points for illiterate people ▫ CDR level: 2 to 3	Age (mean years): IG: 84.4; CG: 80.7 Sex (female; %): IG: 100%; CG: 70% MMSE IG: 11.1; CG: 6.8	IG: Multisensory stimulation, twice a week for 30 min, in summary− 24 sessions 720 min CG: care as usual	Intervention period: 12 weeks ▫ Pre-post intervention assessment	Cognitive function ▫ MMSE BPSD ▫ NPI ▫ CSDD	No intervention effect observed
Mapelli et al. [65] Italy	Cognitive Stimulation for PlwD	To investigate the effectiveness of cognitive	▫ RCT	*Inclusion* ▫ CDR stage: 1 or 2 ▫ MMSE score: 14 to 24	Age (mean years): IG: 82.6; PG: 84.5;	IG: 40-session program over 8 weeks for 1 h per session or	Intervention period: 8 weeks ▫ Baseline: T0 ▫ Follow-up: after a period of 8 weeks	Cognitive function ▫ CDR ▫ MMSE	Improvements in cognitive functions, BPSD, and ADL were observed in the intervention group.

(*continued on next page*)

Table 1 (*Continued*)

Source Country N	Intervention type	Objective	Design	Inclusion (cognition)	Participants	Intervention *Frequency & duration* *Total therapy minutes*	Intervention period, Follow-up	Outcomes & instruments	Main findings
N= 30 IG: 10 PG: 10 CG: 10		stimulation program on cognition, activities of daily living, and behavioral and psychological symptoms of dementia on PlwD		▫ Ability to communicate and understand verbal and written language	CG: 84.7 Sex (female; %): IG: nonreported; PG: nonreported; CG: nonreported *MMSE* IG: 20.1; PG: 19.7; CG: 18.8;	5 h weekly 2400 min		▫ ENB2 BPSD ▫ Behave-AD scale ▫ GDS ADL ▫ Activity of Daily living scale	
Middelstaedt et al. [66] Germany N= 71 IG: 36 CG: 35	Cognitive Stimulation for PlwD	To investigate the effects of a CS program on cognition, QoL, BPSD, and ADL in PlwD and to define predictors of intervention outcomes	▫ RCT	*Inclusion* ▫ Diagnosis of dementia ▫ Mild to moderate dementia ▫ MMSE score: 10 to 25 ▫ Age ≥ 50	Age (mean years): IG: 86.25; CG: 86.49 *Sex (female; %):* IG: 83.3%; CG: 85.7% *MMSE* IG: 16.78; CG: 17.06,	IG: Eight-week CS program, twice a week for 60 min 960 min	Intervention period: 8 weeks ▫ Pre-post intervention assessment + six week follow-up	Cognitive function ▫ ADAS-cog BPSD ▫ NPI-NH ADL ▫ ADCS-ADL Quality of life ▫ QoL-AD	The interaction effects were not significant for the measured outcomes.
Nakamae et al. [67] Japan N= 36 IG: 17 CG: 19	Effects of productive activities with reminiscence in occupational therapy for PlwD	To test the hypothesis that productive activities with reminiscence in occupational therapy can alleviate depressive symptoms and improve task performance on PlwD	▫ Pilot RCT	*Inclusion* ▫ Age > 65 ▫ Being a woman ▫ Mild to severe dementia ▫ MMSE score ≤ 23 points	Age (mean years): IG: 84.76; CG: 87.16 Sex (female; %): IG: 100%; CG: 100% MMSE IG: 13.07; CG: 14.20	IG: Six consecutive weekly sessions which lasted 40 min 240 min	Intervention period: 6 weeks ▫ At baseline and after the 6th session	Cognitive function ▫ MMSE BPSD ▫ CSDD ▫ MOSES ▫ Vitality index	By comparing the PAROT and control groups after the six sessions, no significant differences in the overall CSDD, MOSES, Vitality Index, or MMSE scores were observed.
Namazi and Haynes [68] United States of America N = 15 IG = 5 aCG = 5 pCG = 5	Sensory stimuli reminiscence for people with AD	To test the utility of reminiscence for people with AD	▫ Controlled trial	*Inclusion:* ▫ Clinically probable dementia of the Alzheimer's type	Age (mean years): IG: 81.0; aCG: 83.8; pCG: 79.8 Sex (female; %): IG: 100%; aCG: 100%; pCG: 100% MMSE IG: 13.4; aCG: 12.6; pCG: 11.4	IG: 30 min., 3x/week, 4 weeks = 12 weeks 360 min aCG: 30 min., 3x/week, 4 weeks= 12 weeks 360 min pCG: usual care	Intervention period: 4 weeks ▫ Postassessment after 4 weeks from baseline ▫ no further follow-up assessments	Cognitive function: ▫ MMSE BPSD: ▫ CMAI ▫ Marx, and Rosenthal's agitation inventory	Improvements were observed only in the cognitive functions in the intervention group.
Name et al. [69] France N = 48 Music group = 18 Cooking Group = 19	Musical Interventions for PlwD	To test if the intervention has a positive effect on cognitive function, emotional and behavioral status of people with AD	▫ RCT	*Inclusion* ▫ Diagnostic criteria for Dementia of Alzheimer ▫ MMSE Score ≤20 ▫ Native French speaker	Age (mean years): Music group: 86.7; Cooking group: 87.5 Sex (female; %): Music group: 83.3%; Cooking group: 89.5%: 10.5% (17:2) MMSE Music group: 9.5 Cooking group: 10.8	IG: Twice a week for a period of 4 weeks for a total of 8 h 480 min	Intervention period: 4 weeks ▫ Baseline assessment 2 weeks (BL-1) and 1 week (BL0) before intervention ▫ 2 follow-up measures: after 2 weeks (POST+2) and after 4 weeks (POST+4)	Cognitive function ▫ Abbreviated version of the SIB BPSD ▫ CMAI ▫ NPI ▫ STAI-A	No significant change in the cognitive functions after the music or the cooking intervention was observed. Positive changes in the emotional state were observed as a decrease in the severity of the behavioral disorders of the IG.
*Oliveira, Gamito, Souto, Conde, Ferreira, Corotnean, Fernandes, Silva, Neto [70] Portugal N=17 IG: 10 CG: 7	ADL-training	To evaluate the impact of cognitive stimulation using the Systemic Lisbon Battery in a group of older adults with mild-to-moderate dementia due to AD And to provide preliminary evidence for the feasibility of this intervention	▫ RCT	Inclusion ▫ Being older adults with AD ▫ Fluent in Portuguese ▫ Age > 65	Age (mean years): IG: 82.60; CG: 84.14 Sex (female; %): IG: 70%; CG: 50% MMSE IG: 18.60 CG: 13.00	IG: Individual cognitive stimulation sessions (duration each 45 min.), two sessions per week for a 2-month intervention CG: usual care 540 min.	Intervention period: 4 – 6 weeks Pre-Post intervention assessment	Cognitive function ▫ MMSE ▫ CDR BPSD ▫ GDS ADL ▫ FAB ▫ Trail Making Test ▫ IADL	IG1 showed significant improvement between baseline and follow-up for cognition, No further intervention effect observed
Orrell et al. [71] UK N=35 IG1: 8 IG2: 12 CG:15	Maintenance Cognitive Stimulation Therapy (MCST) for PlwD	To investigate the benefits in cognition and quality of life through CST for PlwD„	▫ Explora-tory Pilot-RCT	Inclusion ▫ DSM-IV criteria for dementia ▫ MMSE Score: 10 to 24	Age (mean years): IG1: 84.3; IG2: 82.8; CG: 85.82 Sex (female; %): IG1: 87.5%; IG2: 100%; CG: 100% *MMSE* IG1: 13.6 IG2: 12.6 CG: 13.5	IGs: Seven weeks twice weekly + 16 weeks maintenance CST (once weekly) 630 + 720 = 1350 min Total for IG 1: 23 weeks (= 5,75 months)	Intervention period: 7 weeks ▫ T0 Baseline CST Trial (7 weeks) ▫ T1 Assessment one week after the trial (=week 8) ▫ T2 CST Maintenance Assessment the week following the maintenance program (= week 24)	Cognitive function ▫ MMSE BPSD ▫ Holden Communication scale ▫ CAPE-BRS Quality of life ▫ QoL-AD	Cognitive functions improved for the participants receiving CST. There were no differences between groups in quality of life, communication, or behavioral function over time.
Ozdemir and Akdemir [72] Turkey N = 27	Multisensory stimulation on cognition, depression, and anxiety of people with AD	To test the effectiveness of musical therapy, painting inanimate object pictures and orientation to time-	▫ quasiexperimental design	▫ Not reported	Age (mean years): 59.3% were aged ≥81 Sex (female; %): 74.1% MMSE Not reported	IG: 12 activity sessions in a three week-period with four weekly sessions per group	Intervention period: 3 weeks ▫ T0: Baseline ▫ T1: directly after completion ▫ T2: 3 weeks later	Cognitive function ▫ MMSE BPSD ▫ GDS ▫ Anxiety Score ▫ Beck Anxiety Scale	Improvement in cognitive functions and all measurements concerning the BPSD in the intervention group.

(*continued on next page*)

Table 1 (*Continued*)

Source Country N	Intervention type	Objective	Design	Inclusion (cognition)	Participants	Intervention *Frequency & duration* *Total therapy minutes*	Intervention period, Follow-up	Outcomes & instruments	Main findings
		place-person intervention on the cognitive functions, depression, and anxiety symptoms of patients with AD.							
Piras et al.[73] Italy N = 35 IG: 21 CG: 14	Cognitive stimulation therapy for older adults with VD	To assess the potential benefit of a CST program in an Italian context (CST-IT) in cognition; quality of life; mood and behavior, and everyday life functioning in people suffering from vascular dementia	▫ RCT	*Inclusion* ▫ Diagnosis of V ▫ MMSE score > 14	Age (mean years): IG: 83.81; CG: 85.43 Sex (female; %): IG: 71.4%; CG: 92.9% *MMSE* IG: 20.29; CG: 19.03	IG: 45 min twice a week for 7 weeks (14 structured group sessions) In total 18 sessions (both groups; 2 pretest + 2 posttest individual sessions) 630 min	Intervention period: 7 weeks ▫ T0: Baseline/Pre-Test ▫ T1: Post-Test	Cognitive function ▫ MMSE ▫ ADAS-Cog ▫ The Backwards digit span task ▫ The narrative language test BPSD ▫ CSDD ▫ The social and emotional loneliness scale ▫ NPI ADL ▫ DAD Quality of life ▫ QoL-AD	Improvements were observed in the cognitive functions and the quality of life of the intervention group.
Rosswurm[74] USA N=30 IG:15 CG:15	Attention-focusing program for PlwD	To investigate the effectiveness of an attention-focusing group (AFG) program for stimulating the perceptual/cognitive processing, functional performance, and social interactions of PlwD	▫ RCT - Pilot study	*Inclusion* ▫ Diagnosis of AD ▫ MMSE Score < 20 ▫ Completion of a color-matching screening task to rule out any severe visual or hearing deficit	Age (mean years): IG: 84 Sex (female; %): 60% *MMSE* IG: 9.86; CG: 11,1	IG: Each group met for 30-minute sessions three times weekly for four weeks 360 min	Intervention period: 4 weeks ▫ Pretest assessment: 2 days before intervention ▫ Posttest assessments: 2 days post-intervention and three weeks later	Cognitive function ▫ MMSE ▫ Perceptual-matching tasks BPSD ▫ DBS	Improvements were observed in cognitive functions and BPSD of the intervention group.
Safavi et al.[75] Iran N= 52 IG: 26 CG: 26	Multisensory stimulation (MSS) for women with AD	To determine the effect of multisensory stimulation on cognitive status of patients with AD in Iran	▫ Clinical trial	*Inclusion* ▫ Being a woman ▫ Mild to moderate Alzheimer's disease based ▫ MMSE score: 10-26	Age (mean years): IG.68.27; CG: 68.19 Sex (female; %): IG: 100%; CG: 100% *MMSE* IG: 16.12; CG: 15.69	IG: 20 sessions of multisensory stimulation, each lasting 45 min 900 min	Intervention period: nonreported ▫ Before-after assessment	Cognitive functions. ▫ MMSE ▫ BCSE	Multisensory Cognitive status of the participants in the experimental group was improved.
Seifert et al.[76] Germany N= 12 IG: 6 CG: 6	Sculpture based art therapy in PlwD	To collect initial data on the effectiveness of sculpting in male dementia patients.	▫ Controlled trial	*Inclusion* ▫ Dementia ▫ MMSE Score: 0-18	Age (mean years): None reported Sex (female; %): IG: 0%; CG: 0% *MMSE* *IG: 13.2; CG: 10.7*	IG: Once a week for two hours over a period of thirteen weeks 1560 min	Intervention period: 13 weeks ▫ T0: the day preceding the project ▫ T1: the day of the project ▫ T2: the day following the project	Cognitive function ▫ MMSE BPSD ▫ NPI	No improvement was observed in the cognitive functions or the BPSD of the participants.
Tadaka and Kanagawa[77] Japan N= 60 IG= 30 IG-AD:12 IG-VD:18 CG=30 CG-AD:12 CG-VD:18	Reminiscence group in elderly people with AD and VD in a community setting	This study reports the effects of an RT group program on the remaining capacity for activities of daily life in elderly people with AD and VD	▫ RCT	*Inclusion* ▫ Diagnosis of AD or VD ▫ Clinical dementia rating (CDR) score of 1 or 2 ▫ No speech or vision disorders	Age (mean years): IG-AD: 82.5 IG-VD:85.3 CG-AD:81.2 CG-VD:83.2 Sex (female; %): IG-AD:66.7%; IG-VD:72.2%; CG-AD:83.3%; CG-VD:61.1% *MMSE* IG-AD: 14.6; IG-VD:19.8; CG-AD:14.9; CG-VD: 18.2	IG: Reminiscence group program in a geriatric health facility for 8 weeks, once a week, at 60-90 min per session 600 min	Intervention period: 8 weeks ▫ Pre/post intervention intervention post-intervention ▫ Follow-up: 6 months after the end of the intervention	Cognitive function ▫ MMSE BPSD ▫ MOSES	For participants with vascular dementia, the intervention group had significant improvement in cognitive function compared with the control group immediately after intervention.
Tanaka et al.[78] Japan N=60 IG: 20 PI: 20 CG: 20	Comparison between group and personal rehabilitation for dementia in a geriatric health service facility	To compare the effects of rehabilitation involving group and personal sessions on PlwD	▫ RCT	*Inclusion* ▫ Dementia diagnosis ▫ MMSE score 5-25	Age (mean years): IG: 84.9; PI: 86.0; CG: 86.5 Sex (female; %): IG: 80%; PI: 95%; CG: 95% *MMSE* IG: 14.2; PI: 15.8; CG: 17.2	IG: Group intervention (12 weeks, twice a week for 1 h) 1440 min PI: Personal intervention (12 weeks, twice a week for 20 min) 480 min CG: usual care	Intervention period: 12 weeks ▫ Pre-post intervention	Cognitive function ▫ MMSE ▫ CDR ▫ BPSD ▫ Vitality index ▫ ADL ▫ Communication scale ▫ NOSGER ▫ Quality of life ▫ QoL-D	IG showed significant improvement in cognitive functions. No significant interactions or improvements for other measurements were found.
Van Bogaert et al.[79] Belgium N = 82 IG: 41 CG: 41	SolCos Model-Based Individual Reminiscence on PlwD with AD	To examine the effectiveness of individual sessions of reminiscence therapy on the cognitive function and mood of PlwD.	▫ Pilot stub	*Non reportedHowever, mentioned that they were* ▫ PlwD with AD ▫ resident or attending the participating study sites	Age (mean years): IG:83; CG: 85 Sex (female; %): IG : 90.2%; CG : 75.2% *MMSE* IG: 18.39; CG: 18.27	IG: Over a period of 4 weeks and comprised of two-45 minute sessions per week. 360 min	Intervention period: 4 weeks ▫ Pre/post-intervention	Cognitive Function ▫ MMSE ▫ FAB BPSD ▫ NPI ▫ GDS ▫ CSDD	Cognitive functions and BPSD were mostly improved in the intervention group.
Van Bogaert et al.	SolCos model-based individual	To investigate the effect of a	▫ RCT	*Inclusion* ▫ Age ≥ 60	Age (mean years): IG: 84;	IG: 2 times per week for 8 weeks for 45 min: 16	Intervention period: 8 weeks ▫ Pre-post intervention assessment	Cognitive functions ▫ MMSE	

(*continued on next page*)

Table 1 (*Continued*)

Source Country N	Intervention type	Objective	Design	Inclusion (cognition)	Participants	Intervention *Frequency & duration* *Total therapy minutes*	Intervention period, Follow-up	Outcomes & instruments	Main findings
[80] Belgium N= 72 IG: 36 CG: 36	reminiscence for PlwD in nursing homes	standardized individualized intervention based on the SolCos transformational reminiscence model on depressive symptoms, cognition, and behavior for PlwD, performed by trained nursing home volunteers as facilitators.		▫ Diagnosed with major neurocognitive disorder according to the DSM-V criteria ▫ MMSE score: 10-24	CG: 84 Sex (female; %): IG: 82.8%; CG: 77.4% *MMSE* IG: 15; CG: 18	sessions x 45 min 720 min	▫ T0 and T1 week 9 of the intervention (weeks 0 and 10 before and after the trial, respectively)	▫ FAB ▫ BPSD ▫ NPI ▫ CSDD	Significate impact on depressive symptoms. No impact on cognition and behavior was observed
Wang, [81] Taiwan N= 102 IG = 51 CG = 51	Group reminiscence therapy for cognitive and affective PlwD	To test the effectiveness of structured group reminiscence therapy on cognitive and affective function of PlwD.	▫ RCT	*Inclusion* ▫ Age ≥ 65 ▫ Mild to severe dementia ▫ CDR score of 1–3	Age (mean years): IG: 79.76; CG: 78.92 Sex (female; %): IG: 52.9%; CG: 49.0% MMSE IG: 14.33; CG: 14.33	IG: Eight group sessions, one session per week, for a period of 8 weeks. Each session lasted up to 60 min. 480 min	Intervention period: 8 weeks ▫ 1 week before the intervention and after the intervention, ▫ no follow-up	Cognitive function ▫ MMSE ▫ BPSD ▫ GDS-SF ▫ CSDD	Improvements in cognitive functions and BPSD were observed in the intervention group.
Yamagami et al. [82] Japan N=54 IG:28 CG:26	Brain-Activating Rehabilitation for PlwD	To improve the effectiveness of brain-activating rehabilitation for dementia.	▫ RCT	*Inclusion* ▫ Diagnoses of ▫ Without severe auditory and visual impairments ▫ Being able to engage in a simple activity or a brief conversation	Age (mean years): IG:85.4; CG:84.9 Sex (female; %): IG:96.4%; CG:84.6% *MMSE* None reported	IG: 1 h twice a week for 12 weeks (24 sessions); the control group had no treatment 1440 min	Intervention period: 12 weeks ▫ Pre-post intervention assessment	Cognitive functionHDS-R ▫ Trail-making test ▫ CDR ▫ BPSD ▫ MOSES	Partly improvements in cognitive functions (CDR was significantly different) and full improvements in BPSD in the intervention group.
Yamanaka et al. [83] Japan N= 56 IG: 26 CG: 30	Cognitive Stimulation Therapy Japanese version (CST-J) for PlwD	To examine the effect of the CST for PlwD in long-term residential care.	▫ RCT	*Inclusion* ▫ Diagnosis of dementia ▫ MMSE score >10	Age (mean years): IG: 84.12; CG: 83.73 Sex (female; %): IG: 77%; CG: 80% *MMSE* IG: 17.00; CG: 16.87	IG: PA14 sessions twice a week for 7 weeks for approximately 45 min 630 min	Intervention period: 7 weeks ▫ Pre-post intervention assessment	*Cognitive functions* ▫ MMSE ▫ COGNISTAT ▫ *BPSD* ▫ Face scale mood ▫ *Quality of life* ▫ QoL-AD ▫ Self-administered health index of EQ-5D (EuroQol Group)	Significant improvements in cognition and quality of life in the intervention group.

Abbreviations: AD = Alzheimer disease, ADAS-Cog = Alzheimer's Disease Assessment Scale-Cognitive Subscale test, AM = attentive matrices, BANSS = Bedford Alzheimer Nursing Severity Scale, BDI = Beck Depression Index, BPRS = Brief Psychiatric Rating Scale, BCSE = Brief cognitive status exam, CA = constructional apraxia test, CAPE = Clifton Assessment Procedure for the Elderly, CAPE-BRS = Clifton Assessment Procedure for the Elderly, CASI = Cognitive Abilities Screening Instrument, CDR = Clinical Dementia Rating2, CDR = Clinical Dementia Scale, CERAD = Consortium to establish a Registry for Alzheimer's Disease, CES-D = Center for Epidemiological Studies Depression Scale, CG = Control Group, CGD = Geriatric Depression Scale, CMAI = Cohen-Mansfield Agitation Inventory, CSDD = Cornell Scale for Depression in Dementia, CVF = verbal fluency, DAD = Disability Assessment for Dementia, DB= Dementia Behaviour Scale, DSM-V = Diagnostic and Statistical Manual of Mental Disorders V, DST = Digit Span Test, FAB: Frontal Assessment Battery; ENB-2: Esame Neu

criterion (item 10). Only two studies identified internal facilitators and barriers to the intervention (item 11), which could have influenced the intervention, for example, the inability to have exhaustive recruitment due to the particular setting. The study revealed that any intervention for people living with dementia is accompanied by compassion and may help improve the overall well-being of people living with dementia. The external conditions that could influence the intervention were rarely described (n=5). Finally, the costs or required resources for the delivery of the intervention (item 13) were only partially described in four studies.

Patient participation based on GRIPP2

Overall, patient participation was rarely reported (see Table S2). No study included people living with dementia on their research team, and only one study included people living with dementia on their advisory team.

Effects of the interventions

As the effectiveness of interventions was not the focus of this review, we only briefly summarize the main study findings concerning intervention effectiveness for different outcomes (see Table S3 for details). Of the 48 studies exploring cognitive function, 21 reported significant positive effects, 16 reported no significant effects, 10 reported mixed findings (both positive results and no improvements in different outcomes), and one did not report results. Among the 40 studies exploring BPSD, 18 reported significant positive effects, 17 reported no significant effects, and five reported mixed findings. For activities of daily living, eight of 23 studies reported positive effects, and 15 studies reported no significant effects. Among the 15 studies exploring quality of life, six reported positive effects, and nine reported no significant effects (see Table S3 for details).

Discussion

The main aim of this review was to identify, describe, and summarize the characteristics of complex CS interventions targeting people living with dementia in nursing homes.

We included 49 publications with 2795 participants representing different interventional approaches applying complex, non-pharmacological CS interventions. The most frequently evaluated intervention components were reminiscence therapy (n=23), cognitive exercises (n=18), and physical and relaxing exercises (n=16). Studies were heterogeneous in terms of intervention components as well as the mode, intensity, duration of intervention delivery, and dementia severity of the study participants.

The studies included in this review presented CS interventions implemented for a limited time, with the longest intervention period of 54 weeks and the shortest intervention period of 3 weeks. Although in terms of intervention studies, the intervention periods may be considered relatively long, the interventions were not implemented to be delivered on a long-term period or a regular daily basis. However, maintaining CS interventions in nursing homes for long-term implementation seems to be related to better results in terms of the quality of life of people living with dementia.[26]

Various actors provided CS interventions in the included studies, with nurses rarely reported as intervention providers. On the basis of an own qualitative study,[27] it seems clear that nurses can actively provide CS interventions for people living with dementia. This is also supported by a survey conducted among nursing home managers, who attributed a key role to nurses in the implementation of CS activities and largely assumed that regular CS activities could be easily integrated into routine nursing care.[28]

Greater consideration of nurses in the implementation offers a clear potential to increase the effectiveness of CS interventions and will contribute to empowering the professional role of nursing staff by giving them a key role in CS interventions during daily practice. Therefore, if interventions are provided as 24/7 approaches included in care routines, the involvement of nurses, as the main carers in nursing homes, is a prerequisite. An integration of CS activities should not be seen as an additional burden for nurses, as they are already providing CS care unconsciously. Interventions to implement a 24/7 approach could support nurses to deliver this care more guided, systematic, and target-oriented. This could have a positive impact on nursing care.

The reporting of interventions was often poor in the included studies, especially concerning complex intervention methodologies. While there was much information on interventions and intervention components, on the basis of the analysis via TIDieR,[17] the quality of this information was frequently insufficient. Moreover, essential information was lacking, e.g., on interventions' underlying theories, intervention provisions and providers, and intervention components. Only one study provided information on the intervention being planned to be personalized at any point and tailored or adapted to participants' needs. None of the studies provided information about interventions' adherence and fidelity or about strategies to improve and maintain interventions.

Although this review did not identify interventions provided via a 24/7 approach, it seems that the implementation of CS interventions would be more feasible and effective if implemented. Many components of the included interventions could be implemented via a 24/7 approach. One example could be reminiscence therapy, which could be applied throughout the day with different staff members applying cognitive exercises, e.g., during meals. Ideally, CS interventions for people living with dementia should be integrated into daily care. This seems particularly possible in nursing homes, where professional caregivers are continuously available and where people living with dementia frequently have severe dementia and/or are bedridden. For this group of people, individual CS integrated into daily care seems more suitable than group offers.

Interventions were mostly offered in group settings and only rarely individually. The results of this review suggest that the interventions provided are not based on individual wishes and needs. Research concerning person-centered care suggests that interventions for people living with dementia should be adapted to people's wishes, needs, and demands.[29] A recent survey on the attitudes of nursing managers concerning CS interventions already implemented in nursing homes also indicated the necessity of implementing CS interventions adapted to the needs and wishes of people living with dementia.[28]

Patient and public involvement (PPI) has been proposed as an important issue in planning, conducting, and evaluating studies. Guidelines claim that people living with dementia are concerned that an intervention should be included in all of the steps of the research.[30] This could lead to a better impact on the inclusion of people with dementia in research, a better acceptance of people living with dementia for interventions regarding their cognitive functions, and a better understanding of the interventions.[31] Surprisingly, none of the included studies involved people living with dementia or their significant others as members of the research team, and only one study included people living with dementia on the study's advisory team.

As is frequently the case in complex intervention research, we are unable to define the most effective components and thus cannot recommend any components. As a prerequisite to being able to identify effective intervention components, interventions need to be developed, conducted, and reported, using adequate mixed-method studies following complex intervention frameworks.[13,32] In addition,

interventions must be described in detail to allow for replication and implementation in different contexts.[18] Therefore, there is a clear need to develop evidence-based interventions, describe single components in detail, evaluate the intervention in a clinical setting, and conduct comprehensive process evaluations.

For nursing home practice, our results show that, at present, only limited advice concerning the format and content of CS interventions to be implemented is possible. However, the detailed description of the interventions in this review provides a comprehensive and detailed overview of intervention components for the implementation of CS. This could be the basis for the further development of CS interventions in terms of content and methodology. This includes the development of new intervention components, the new combination of different existing intervention components, the digitalization of CS intervention components, or the adaptation of group-based components to individual intervention components integrated into routine care.

The results will help to compare existing interventions and to develop new complex interventions on the basis of current frameworks for complex interventions.[33] For example, the results can be used for the possible digitalization of intervention components or the development of a continuous 24/7 CS complex intervention, allowing for the continuous application of CS interventions during routine care. The results have informed the development of an own CS trial for people living with dementia applying CS interventions as a 24/7 approach, which is currently being evaluated (CogStim24h) (Trial registration, German Clinical Trials Register: DRKS00024381, registered on July 14th, 2022).[34]

Strengths and limitations

The strengths of this review include the predefined and registered methods and the rigorous methodological approach, including a sensitive search in all relevant databases and a selection and evaluation process performed by two independent reviewers. This is the first review to summarize and explain complex non-pharmacological CS interventions aimed at improving cognitive function in people living with dementia in nursing homes by applying established TIDieR, CReDECI2, and GRIPP2 as established reporting guidelines. Previous systematic reviews did not elaborate on the nature and challenges of intervention components in complex settings. We initially planned to include interventions applied in any setting, but during the screening process, considering the number of studies in the nursing home setting, we decided to include only studies conducted in nursing homes to reduce heterogeneity.

As a limitation, an even more comprehensive search, for example, through expert consultation or forward and backwards citation tracking, was not possible within the scope of our study.

Conclusions

There are various approaches to CS interventions for people living with dementia in nursing homes. The reporting of interventions and components was frequently limited and not exhaustive enough to allow for adequate replicability, thereby limiting the implementation of CS interventions. Owing to the marked heterogeneity between CS interventions, future studies should apply established frameworks to describe intervention components and implementation strategies and extend reporting on intervention content and conduct. This particularly applies to the integration of process evaluations to describe mechanisms of action and the importance of different context factors. In addition, patient and public involvement has not yet been established in this field and should be considered throughout the research process in future studies. Finally, no 24/7 approach to CS intervention could be identified for this review, although this seems to be a promising approach, and many components could be implemented in a 24/7 approach. Based on the detailed description of existing interventions, this review provides a knowledge base for the development and adaptation of CS interventions, including intervention programs based on a 24/7 approach.

Funding source

This review was funded by the German Society of Alzheimer's disease (DAlzG Fonds 3649/8011/31).

Declaration of competing interest

JG declares that he has no known conflicts of interest. SK declares that there are no known conflicts of interest. JB declares no known conflicts of interest. IM declares that there are no known conflicts of interest. ÜSS declares no known conflicts of interest. AKF is the author of the cognitive intervention programs NEUROvitalis and NEUROvitalis Sinnreich but received no corresponding honoraria. EK is the author of the cognitive intervention programs NEUROvitalis and NEUROvitalis Sinnreich but received no corresponding honoraria. MND declares no known conflicts of interest.

CRediT authorship contribution statement

Julie Guicheteau: Writing – review & editing, Writing – original draft, Validation, Software, Project administration, Methodology, Investigation, Formal analysis, Conceptualization. **Ümran Sema Seven:** Writing – review & editing, Methodology, Investigation. **Jana Boes:** Writing – review & editing, Methodology. **Ina Monsef:** Investigation, Data curation. **Sascha Köpke:** Writing – review & editing, Validation, Supervision, Methodology, Investigation, Conceptualization. **Ann-Kristin Folkerts:** Writing – review & editing, Conceptualization. **Justina Doffiné:** Writing – review & editing, Methodology. **Elke Kalbe:** Writing – review & editing, Conceptualization. **Martin N. Dichter:** Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Investigation, Conceptualization.

Acknowledgments

We would like to thank Prof. Dr. Med. Nicole Skoetz (Cochrane Hematology, Cologne, Germany), Maria Erdmann (Quality Management, Vinzentinerinnen, Cologne, Germany), and Romina Gollan (Deakin University, Geelong, Victoria, Australia) for their support and suggestions.

Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.gerinurse.2025.103586.

References

1. APA. Diagnostic and statistical manual of mental disorders - 5th Edition. 2013;21:591-643.
2. Gauthier S., Rosa-Neto P., Morais J.A., Webster C. World Alzheimer report 2021: journey through the diagnosis of dementia. *Alzheimer's Disease International.* 2021.
3. Woods B, Aguirre E, Spector AE, Orrell M. Cognitive stimulation to improve cognitive functioning in people with dementia. *Cochrane Database Syst Rev*. 2012(2): Cd005562. https://doi.org/10.1002/14651858.CD005562.pub2.
4. Mukamel DB, Saliba D, Ladd H, Konetzka RT. Dementia care is widespread in US nursing homes; facilities with the most dementia patients may offer better care: study examines dementia care, patient populations, and facility characteristics at US nursing homes. *Health Aff*. 2023;42(6):795–803.
5. Hoffmann F, Kaduszkiewicz H, Glaeske G, van den Bussche H, Koller D. Prevalence of dementia in nursing home and community-dwelling older adults in Germany. *Aging Clin Exp Res*. 2014;26:555–559.

6. NICE. *Guideline - dementia: assessment, management and support for people living with dementia and their carers*. London, 2018.
7. Clare L, Woods RT. Cognitive training and cognitive rehabilitation for people with early-stage Alzheimer's disease: a review. *Neuropsychol Rehabil*. 2004;14(4):385–401.
8. Taulbee LR, Folsom JC. Reality orientation for geriatric patients. *Psychiatric Serv*. 1966;17(5):133–135.
9. Cafferata RM, Hicks B, von Bastian CC. Effectiveness of cognitive stimulation for dementia: a systematic review and meta-analysis. *Psychol Bull*. 2021;147(5):455.
10. Woods B, Aguirre E, Orrell M, Spector A. Cognitive stimulation to improve cognitive functioning in people with dementia. Cochrane Database Syst Rev. 2023. 1(1): CD005562. Published 2023 Jan 31. doi:10.1002/14651858.CD005562.pub3.
11. Sikkes SAM, Tang Y, Jutten RJ, et al. Toward a theory-based specification of non-pharmacological treatments in aging and dementia: focused reviews and methodological recommendations. *Alzheimers Dement*. 2021;17(2):255–270.
12. Bahar-Fuchs A, Clare L, Woods B. Cognitive training and cognitive rehabilitation for persons with mild to moderate dementia of the Alzheimer's or vascular type: a review. *Alzheimers Res Ther*. 2013;5:1–14.
13. Skivington K, Matthews L, Simpson SA, et al. A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance. *BMJ*. 2021;374:n2061.
14. Langner H, Nordhausen T, Fleischer S, Meyer G, Berg A. [Improving cognitive resources of nursing home residents: a systematic review of prevention and health promotion interventions]. *Z Evid Fortbild Qual Gesundhwes*. 2019;149:1–11.
15. Saragih ID, Tonapa SI, Saragih IS, Lee B-O. Effects of cognitive stimulation therapy for people with dementia: a systematic review and meta-analysis of randomized controlled studies. *Int J Nurs Stud*. 2022;128:104181.
16. Gibbor L, Yates L, Volkmer A, Spector A. Cognitive stimulation therapy (CST) for dementia: a systematic review of qualitative research. *Aging Ment Health*. 2021;25(6):980–990.
17. Hoffmann TC, Glasziou PP, Boutron I, et al. Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. *BMJ: Br Med J*. 2014;348:g1687.
18. Möhler R, Köpke S, Meyer G. Criteria for reporting the development and evaluation of complex interventions in healthcare: revised guideline (CReDECI 2). *Trials*. 2015;16:204.
19. Staniszewska S, Brett J, Simera I, et al. GRIPP2 reporting checklists: tools to improve reporting of patient and public involvement in research. *BMJ*. 2017;358:j3453.
20. Higgins JPT, López-López JA, Becker BJ, et al. Synthesising quantitative evidence in systematic reviews of complex health interventions. *BMJ Glob Health*. 2019;4(Suppl 1):e000858.
21. Rethlefsen ML, Kirtley S, Waffenschmidt S, et al. PRISMA-S: an extension to the PRISMA statement for reporting literature searches in systematic reviews. *Syst Rev*. 2021;10(1):1–19.
22. Folkerts AK, Roheger M, Franklin J, Middelstädt J, Kalbe E. Cognitive interventions in patients with dementia living in long-term care facilities: systematic review and meta-analysis. *Arch Gerontol Geriatr*. 2017;73:204–221.
23. Innovation VH. Covidence Systematic Review Software. In. Melbourne, Australia.
24. Higgins JP, Green S, Collaboration C. Section 13.5. 2.3. Tools for assessing methodological quality or risk of bias in non-randomized studies. *Cochrane Handbook for Systematic Reviews of Interventions, Version 5 1*. 2011.
25. Joanna Briggs Institute J. Critical appraisal checklist for quasi-experimental studies (Non-randomized experimental studies) checklist. Available online: https://jbi.global/sites/default/files/2019-05/JBI_Quasi-Experimental_Appraisal_Tool2017_0.pdf. Accessed 2021.
26. Orrell M, Aguirre E, Spector A, et al. Maintenance cognitive stimulation therapy for dementia: single-blind, multicentre, pragmatic randomised controlled trial. *Br J Psychiatry*. 2014;204(6):454–461.
27. Seven ÜS, Julie G, Kalbe E, Dichter MN, Köpke S, Folkerts AK. Development of a cognitive stimulation program for care facilities – results from a qualiative study with nursing staff about desires, limits and possibilities. In: *Proceedings of the 32nd Alzheimer Europe Conference Building bridges 17.-19.10.2022*. Bucharest, Romania; 2022.
28. Guicheteau J, Köpke S, Seven ÜS, Folkerts AK, Kalbe E, Dichter MN. Attitudes of nursing home managers regarding cognitively stimulating activities in people with dementia: a multicentre cross-sectional study. *Int J Older People Nurs*. 2024;19(5):e12645.
29. Kitwood T. The concept of personhood and its relevance for a new culture of dementia care. In: Jones G, Miesen B, eds. *Care-Giving in Dementia*. London: Routledge; 2021:3–13.
30. Hendriks N, Truyen F, Duval E. Designing with dementia: guidelines for participatory design together with persons with dementia. Paper presented at. In: *Proceedings of the IFIP Conference on Human-Computer Interaction*. 2013.
31. Staley K. Changing what researchers' think and do': is this how involvement impacts on research? *Research for all*. 2017.
32. Moore GF, Audrey S, Barker M, et al. Process evaluation of complex interventions: medical research council guidance. *BMJ*. 2015;350:h1258.
33. Skivington K, Matthews L, Simpson SA, et al. A new framework for developing and evaluating complex interventions: update of medical research council guidance. *BMJ*. 2021;33:374.
34. Folkerts A-K, Seven Ü.S, Guicheteau J, Dichter MN, Köpke S, Kalbe E. Cognitive stimulation for people with dementia in nursing homes: study protocol for a feasibility study examining a new 24/7 approach (CogStim24). BMC Geriatr. 2024. 2024;14(5):e078369. Published 2024 May 9. doi:10.1136/bmjopen-2023-078369.
35. Bourdon E, Belmin J. Enriched gardens improve cognition and independence of nursing home residents with dementia: a pilot controlled trial. *Alzheimers Res Ther*. 2021;13(1):116.
36. Buettner L, Ferrario J. Therapeutic recreation-nursing team: a therapeutic intervention for nursing home residents with dementia. *Annu Ther Recreat*. 1998;7:21–28.
37. Capotosto E, Belacchi C, Gardini S, et al. Cognitive stimulation therapy in the Italian context: its efficacy in cognitive and non-cognitive measures in older adults with dementia. *Int J Geriatr Psychiatry*. 2015;32(3):331–340.
38. Carbone E, Gardini S, Pastore M, Piras F, Vincenzi M, Borella E. Cognitive stimulation therapy for older adults with mild-to-moderate dementia in italy: effects on cognitive functioning, and on emotional and neuropsychiatric symptoms. *J Gerontol B Psychol Sci Soc Sci*. 2021;76(9):1700–1710.
39. Ceccato E, Vigato G, Bonetto C, et al. STAM protocol in dementia: a multicenter, single-blind, randomized, and controlled trial. *Am J Alzheimers Dis Other Demen*. 2012;27(5):301–310.
40. Cheung DSK, Lai CKY, Wong FKY, Leung MCP. The effects of the music-with-movement intervention on the cognitive functions of people with moderate dementia: a randomized controlled trial. *Aging Ment Health*. 2018;22(3):306–315.
41. Christofoletti G, Oliani MM, Gobbi S, Stella F, Bucken Gobbi LT, Renato Canineu P. A controlled clinical trial on the effects of motor intervention on balance and cognition in institutionalized elderly patients with dementia. *Clin Rehabil*. 2008;22(7):618–626.
42. De Luca R, Bramanti A, De Cola MC, et al. Cognitive training for patients with dementia living in a sicilian nursing home: a novel web-based approach. *Neurol Sci*. 2016;37(10):1685–1691.
43. Duru Aşiret G, Kapucu S. The effect of reminiscence therapy on cognition, depression, and activities of daily living for patients with Alzheimer disease. *J Geriatr Psychiatry Neurol*. 2016;29(1):31–37.
44. Fischer-Terworth C, Probst P. Evaluation of a TEACCH-and music therapy-based psychological intervention in mild to moderate dementia: a controlled trial. *GeroPsych*. 2011;24(2):93.. The Journal of Gerontopsychology and Geriatric Psychiatry.
45. Folkerts A-K, Dorn ME, Roheger M, et al. Cognitive stimulation for individuals with Parkinson's disease dementia living in long-term care: preliminary data from a randomized crossover pilot study. *Parkinson's Dis*. 2018. 2018.
46. Gibbor L, Forde L, Yates L, et al. A feasibility randomised control trial of individual cognitive stimulation therapy for dementia: impact on cognition, quality of life and positive psychology. *Aging Ment Health*. 2020;25(6):999–1007.
47. Goldwasser AN, Auerbach SM, Harkins SW. Cognitive, affective, and behavioral effects of reminiscence group therapy on demented elderly. *Int J Aging Hum Dev*. 1987;25(3):209–222.
48. Gómez-Gallego M, Gómez-Gallego JC, Gallego-Mellado M, García-García J. Comparative efficacy of active group music intervention versus group music listening in Alzheimer's disease. *Int J Environ Res Public Health*. 2021;18(15):8067.
49. Gonzalez J, Mayordomo T, Torres M, Sales A, Meléndez JC. Reminiscence and dementia: a therapeutic intervention. *Int Psychogeriatr*. 2015;27(10):1731–1737.
50. Graessel E, Stemmer R, Eichenseer B, et al. Non-pharmacological, multicomponent group therapy in patients with degenerative dementia: a 12-month randomized, controlled trial. *BMC Med*. 2011;9(1):1–11.
51. Hong IS, Choi MJ. Songwriting oriented activities improve the cognitive functions of the aged with dementia. *Arts Psychother*. 2011;38(4):221–228.
52. Hsiao C-Y, Shu-Li C, Hsiao Y-S, Huang H-Y, Shu-Hui Y. Effects of art and reminiscence therapy on agitated behaviors among older adults with dementia. *J Nurs Res*. 2020;28(4):e100.
53. Hutson C, Orrell M, Dugmore O, Spector A. Sonas: a pilot study investigating the effectiveness of an intervention for people with moderate to severe dementia. *Am J Alzheimer's Dis Other Dement®*. 2014;29(8):696–703.
54. İnel Manav A, Simsek N. The effect of reminiscence therapy with internet-based videos on cognitive status and apathy of older people with mild dementia. *J Geriatr Psychiatry Neurol*. 2019;32(2):104–113.
55. Ito T, Meguro K, Akanuma K, Ishii H, Mori E. A randomized controlled trial of the group reminiscence approach in patients with vascular dementia. *Dement Geriatr Cogn Disord*. 2007;24(1):48–54.
56. Jang JS, Lee JS, Yoo DH. Effects of spaced retrieval training with errorless learning in the rehabilitation of patients with dementia. *J Phys Ther Sci*. 2015;27(9):2735–2738.
57. Kim M-J, Han C-W, Min K-Y, et al. Physical exercise with multicomponent cognitive intervention for older adults with Alzheimer's disease: a 6-month randomized controlled trial. *Dement Geriatr Cogn Dis Extra*. 2016;6(2):222–232.
58. Kratzer A, Diehl K, Gefeller O, Meyer S, Graessel E. Non-pharmacological, psychosocial MAKS-s intervention for people with severe dementia in nursing homes: results of a cluster-randomised trial. *BMC Geriatr*. 2022;22(1):1001.
59. Liesk J, Hartogh T, Kalbe E. Kognitive stimulation und musikintervention bei stationär versorgten menschen mit demenz. *Z Gerontol Geriatr*. 2015;48(3):275–281.
60. Lin HC, Yang YP, Cheng WY, Wang JJ. Distinctive effects between cognitive stimulation and reminiscence therapy on cognitive function and quality of life for different types of behavioural problems in dementia. *Scand J Caring Sci*. 2018;32(2):594–602.
61. Lin R, Chen H-Y, Li H, Li J. Effects of creative expression therapy on Chinese elderly patients with dementia: an exploratory randomized controlled trial. *Neuropsychiatr Dis Treat*. 2019;15:2171.

62. Lök N, Bademli K, Selçuk-Tosun A. The effect of reminiscence therapy on cognitive functions, depression, and quality of life in Alzheimer patients: randomized controlled trial. *Int J Geriatr Psychiatry*. 2019;34(1):47–53.
63. Luttenberger K, Hofner B, Graessel E. Are the effects of a non-drug multimodal activation therapy of dementia sustainable? Follow-up study 10 months after completion of a randomised controlled trial. *BMC Neurol*. 2012;12(1):1–9.
64. Machado BM, Castro C. Use of multisensory stimulation in institutionalized older adults with moderate or severe dementia. *Dement Neuropsychol*. 2022;16(2):202–212.
65. Mapelli D, Di Rosa E, Nocita R, Sava D. Cognitive stimulation in patients with dementia: randomized controlled trial. *Dement Geriatr Cogn Dis Extra*. 2013;3(1):263–271.
66. Middelstaedt J, Folkerts A-K, Blawath S, Kalbe E. Cognitive stimulation for people with dementia in long-term care facilities: baseline cognitive level predicts cognitive gains, moderated by depression. *J Alzheimer's Dis*. 2016;54(1):253–268.
67. Nakamae T, Yotsumoto K, Tatsumi E, Hashimoto T. Effects of productive activities with reminiscence in occupational therapy for people with dementia: a pilot randomized controlled study. *Hong Kong J Occup Therapy*. 2014;24(1):13–19.
68. Namazi KH, Haynes SR. Sensory stimuli reminiscence for patients with Alzheimer's disease: relevance and implications. *Clin Gerontol*. 1994;14(4):29–46.
69. Narme P, Clément S, Ehrlé N, et al. Efficacy of musical interventions in dementia: evidence from a randomized controlled trial. *J Alzheimer's Dis*. 2014;38(2):359–369.
70. Oliveira J, Gamito P, Souto T, et al. Virtual reality-based cognitive stimulation on people with mild to moderate dementia due to Alzheimer's disease: a pilot randomized controlled trial. *Int J Environ Res Public Health*. 2021;18(10):5290.
71. Orrell M, Spector A, Thorgrimsen L, Woods B. A pilot study examining the effectiveness of Maintenance Cognitive Stimulation Therapy (MCST) for people with dementia. *Int J Geriatr Psychiatry*. 2005;20(5):446–451.
72. Ozdemir L, Akdemir N. Effects of multisensory stimulation on cognition, depression and anxiety levels of mildly-affected Alzheimer's patients. *J Neurol Sci*. 2009;283(1-2):211–213.
73. Piras F, Carbone E, Faggian S, Salvalaio E, Gardini S, Borella E. Efficacy of cognitive stimulation therapy for older adults with vascular dementia. *Dement Neuropsychol*. 2017;11:434–441.
74. Rosswurm MA. Attention-focusing program for persons with dementia. *Clin Gerontol*. 1991;10(2):3–16.
75. Safavi M, Yahyavi S, Farahani H, Mahmoudi N, Mahboubinia M. The effect of multisensory stimulation (MSS) on cognitive status of women with Alzheimer's disease in Fereshtegan elderly care center. *J Jahrom Univ Med Sci*. 2013;11(2):46.
76. Seifert K, Spottke A, Fliessbach K. Effects of sculpture based art therapy in dementia patients—A pilot study. *Heliyon*. 2017;3(11):e00460.
77. Tadaka E, Kanagawa K. Effects of reminiscence group in elderly people with Alzheimer disease and vascular dementia in a community setting. *Geriatr Gerontol Int*. 2007;7(2):167–173.
78. Tanaka S, Honda S, Nakano H, Sato Y, Araya K, Yamaguchi H. Comparison between group and personal rehabilitation for dementia in a geriatric health service facility: single-blinded randomized controlled study. *Psychogeriatrics*. 2017;17(3):177–185.
79. Van Bogaert P, Van Grinsven R, Tolson D, Wouters K, Engelborghs S, Van der Mussele S. Effects of SolCos model-based individual reminiscence on older adults with mild to moderate dementia due to Alzheimer disease: a pilot study. *J Am Med Dir Assoc*. 2013;14(7). 528. e529-528. e513.
80. Van Bogaert P, Tolson D, Eerlingen R, et al. SolCos model-based individual reminiscence for older adults with mild to moderate dementia in nursing homes: a randomized controlled intervention study. *J Psychiatr Ment Health Nurs*. 2016;23(9-10):568–575.
81. Wang JJ. Group reminiscence therapy for cognitive and affective function of demented elderly in Taiwan. *Int J Geriatr Psychiatry*. 2007;22(12):1235–1240. A journal of the psychiatry of late life and allied sciences.
82. Yamagami T, Takayama Y, Maki Y, Yamaguchi H. A randomized controlled trial of brain-activating rehabilitation for elderly participants with dementia in residential care homes. *Dement Geriatr Cogn Dis Extra*. 2012;2(1):372–380.
83. Yamanaka K, Kawano Y, Noguchi D, et al. Effects of cognitive stimulation therapy Japanese version (CST-J) for people with dementia: a single-blind, controlled clinical trial. *Aging Ment Health*. 2013;17(5):579–586.