Appendix 2. Characteristics of included primary studies by type of intervention

eTable 1. Aromatherapy for behavioural disturbances in patients with dementia

Primary study	*Study design*	*Population*	*Type of intervention, dose, route of administration, frequency and duration in active group*	*Outcome measures*	*Results*
Akhondzadeh 2003 (1)	Placebo controlled, randomized trial	N=42; female 18; mean age 73; Diagnosis of AD, ADAS <=2, CDR >= 2 satisfied the NINCDS/ADRDA criteria	Intake of 60 drops of *Melissa officinalis* extract, daily for 4 months	Alzheimer's disease assessment scale-cognitive subscale	Proportion of participants with agitation was significantly less in the treatment arm
Ballard 2002 (2)	Randomized, double-blind, placebo-controlled trial	N=72, female 43, mean age 78; agitation as defined on CMAI or NPI	10% blended Melissa oil in lotion; application on face and arms; 2 times/day for 4 weeks	CMAI, NPI BI, DCM, CDRS	Significant improvement in the CMAI score
Burns 2011 (3)	3-arm, double-blind parallel-group placebo-controlled randomized trial	N=114; female 48; mean age 85; agitation for4 weeks minimally, CMAI >39, satisfied the NINCDS/ADRDA criteria for possible Alzheimer disease	Arm 1: 10%Melissa oil in base lotion massage into the hands and upper arms, 1–2 min 2 times/day by carer of participants for 12 weeks. Arm 2: 5 mg donepezil daily for 1 month and increased to 10 mg afterwards, plus10% of placebo oil (sunflower) massage	NPI, PAS	No significant improvement.
Cameron 2011 (4)	Cross-over, double-blind placebo-controlled randomized trial	N=18; sex not reported; mean age not reported; inclusion criteria not clearly reported (moderate to severe dementia) (setting not reported)	Intervention group: <2% lemon balm oil	CMAI, PAS, NPI	Gradual, but not statistically significant, reduction in scores in all outcome measures

Fu 2013 (5)	Single-blind parallel-group placebo-controlled randomized trial	N=67; female 40; mean age 84; MMSE <=24/30; AD according to American Psychiatric Association DSM-IV-TR; a documented history of a minimum of two weeks of agitation or aggression in total (consecutively or 14 single days), within the past three months	Arm 1: 3% lavender mist (75 drops); Am 2: 3% lavender mist (75 drops) plus and massage twice a day for 10 days; each hand massaged for2.5 minutes	CMAI	Significant less aggressive behaviour in the arms that used active treatment
Gray 2002 (6)	Placebo controlled clinical trial	N=13; females 6; subjects that have "difficult-to-manage behaviours"	Intervention group: A mix of lavender, sweet orange, tea tree oil soaked into a cotton ball and taped to the lapel of each subject by caregiving staff; Total application: 16 times	Subjects were videotaped and rated by trained observers for frequency of resistive behaviours	No significant difference
Holmes 2002 (7)	Placebo controlled clinical trial	N=15; females 7; diagnostic criteria based on ICD-10 for severe dementia and on a minimum score of 3 points on the PAS; NINCDS/ADRDA criteria for possible Alzheimer's Diasease	Intervention group: Diffusion of 2% lavender oil for 10 sessions; each session lasted 2 h (16.00–18.00 hours) and was followed by placebo (water) for another 2 h; aroma-streams were used for diffusion	PAS	Nine patients (60%) showed an improvement, five (33%) showed no change and one patient (7%) showed a worsening of agitated behaviour during aromatherapy
Lin 2007(8)	Placebo-controlled crossover randomized trial	N=70; female 41; mean age 78; participants with dementia diagnosed with DSM-IV, with clinically significant agitation identified using Chinese version CMAI	Intervention group: Inhalation of essential oils in cosmetic cotton containing lavender diffused by aroma diffuser. Diffusers were placed at each side of the pillow during sleep at night for at least 1 h.	Chinese version CMAI, NPI,	Significant improvement in NPI and CMAI

O'Connor 2011(9)	Cross-over, single-blind placebo-controlled randomized trial	N=66; female 39; mean age 78;Clinical Dementia Rating scale; physically agitated behaviour;	Intervention group: 30% lavender (*Lavandula angustifolia*) in jojoba oil	Observation of behaviour, CMAI, Philadelphia Geriatric Center Affect Rating Scale	No statistical difference between the groups
Smallwood 2001 (10)	3-arm, single-blinded randomized, controlled trial	N=21; Participants with dementia diagnosed by a psychiatrist	Arm 1: lavender oil massage; Arm 2: plain oil massage; Arm 3: conversation and lavender oil diffusion; All 3 arms received treatment twice in a specific period of the day and twice a week	Video-tapes recording behaviour for 15 min in each specified 4 periods during the day, at baseline, and after treatment. Video recordings were rated by 2 blinded raters.	Only in 1 period (between 15.00–17.00 hours) a consistent reduction in agitation was observed in the lavender oil massage arm than in the other two arms.
Snow 2004 (11)	Placebo controlled clinical trial	N=28; females 26; mean age 86; Probable AD with "marked agitation"; CMAI applied by nursing staff	Arm 1: 2 drops of undiluted oil containing lavender, thyme, and unscented grape-seed oil was placed every 3 h on an absorbent fabric sachet pinned near the clavicular part of each subject's shirt. Arm 2: 3 applications/day	CMAI (rated every2 days); Severe Impairment Rating Scale;	No evidence of reduction of agitation

CDRS, Clinical Dementia Rating Scale; CMAI, Cohen-Mansfield Agitation Inventory; DCM, Dementia Care Mapping; DSM, Diagnostic and Statistical Manual of Mental Disorders; NINCDS/ADRDA, National Institute of Neurological and Communicative Disorders and Stroke and Alzheimer's Disease and Related Disorders Association; NPI, Neuropsychiatric Inventory; PAS, Pittsburgh Agitation Scale

eTable 2 describes the type of interventions, the outcomes and the results of the primary studies included in the Message therapy reviews.

Primary study	*Study design*	*Population*	*Type of intervention, dose, route of administration, frequency and duration in active group*	*Outcome measures*	*Results*
Hollyday-Walsh (12)	Before-after study	N=52 participants (39 women and 13 men; mean age 90 years)	Intervention group: 10- to 15-minute massage of the upper extremities; Control group:	Behavioral Symptoms from the Minimum Data Set; a) wandering; b) verbally abusive behavioural symptoms; c) physically abusive behavioural symptoms; d) socially inappropriate/disruptive behaviour; and e)resistance to care	Massage therapy was significantly associated with improvement for 4 of the 5 outcomes
Remington 2002 (13)	Randomized trial	N=42 nursing home residents with a diagnosis of "Chronic organic brain syndrome"	Intervention group: hand massage Frequency: One treatment of 10 min.) Control group: no touch	a) agitation (CMAI)	Agitation reduced: Mean difference: 7.83 (4.30, 11.36)]

CMAI, Cohen-Mansfield Agitation Inventory;

eTable 3. Characteristics of Bright light therapy for behavioural disturbances in patients with dementia

Primary study	*Study design*	*Population*	*Type of intervention, dose, route of administration, frequency and duration in active group*	*Outcome measures*	*Results*
Ancoli-Israel 2003 (14)	3-arm, single-blind, randomized controlled trial	N=92 nursing home residents; female; mean age 82; MMSE mean=5.7 (SD 5.6, range 0-22)	Active group: Bright light > 2500 Lux: time of day 9.30-11.30 or 17.30-19.30 daily; Control group: Dim, red light (control)< 300 Lux: time of day 9.30-11.30 daily; Device used: Apollo "Brite-Lite" box placed 1m from resident Duration of treatment: 10 days	Agitation (ABRS and CMAI); Sleep: sleep duration, sleep efficiency, night-time activity measured after 10 days of treatment	No significant effects in favor of light therapy
Barrick(15)	cluster-unit crossover design	N=66 participants in two residential care settings	Active group: AM bright light (7–11 AM); PM bright light (4–8 PM); All Day bright light (7 AM – 8 PM); Control group: Standard light (i.e. the baseline condition).	CMAI	Ambient bright light resulted not effective in reducing agitation and may exacerbate behavioural symptoms
Burns 2009 (16)	Single-blinded randomized trial	N=48 nursing home residents, female 32; mean age 83; any type of dementia	Active group: Bright light 10,000 lux from 10.00 hrs - noon (Brite-Lite box placed in front of resident); Control group: Standard florescent tube light at 100 lux from 1000 hrs – noon Received treatment daily for two weeks Duration of treatment: 14 days (weeks 2 and 3)	Agitation (CMAI); depression (CSDD)	No significant effects in favor of light therapy

Dowling 2005 (17)	Randomized controlled trial	N=70 nursing home residents; female 57; mean age 84; MMSE 0-23 (mean=7, SD 7)	Active group 1:Bright light exposure >2500 lux morning (9:30-10:30 am) Active group 2: Bright light exposure >2500 lux afternoon (3:30-4:30pm) or supplemented using Apollo Brite Lite IV box placed at least 4 feetfrom resident Control group: The control group received usual indoor light (150-200 lux) and participatedin their regular activities Frequency: Daily, Monday through Friday Duration: 10 weeks	agitation, depression (NPI)	No significant effects in favor of light therapy
Hickman(18)	Cluster-unit crossover trial	N=66 older adults with dementia	Active group: morning bright light, evening bright light, all-day bright light (2,000 to 2,500 lux). Control group and 500 to 600 lux	Depression (CSDD)	No significant effect
Riemersma 2008 (19)		N=199 nursing home patients; mean age 85; any type of dementia	Active group 1: light exposure (using Plexiglas diffusersmounted in ceiling) 1000 lux; Active group 2: light exposure (using Plexiglas diffusersmounted in ceiling) 400 lux + melatonin Active group 3: melatonin only Light exposure frequency: from 9:00 -18:00 Control group: inactive light	Agitation (CMAI); sleep duration and sleep latency; psychiatric symptoms (NPI); depression (CSDD)	No significant different between the groups

ABRS, Agitated Behavior Rating Scale; CMAI, Cohen-Mansfield Agitation Inventory;, CSDD, Cornell Scale for Depression in Dementia; NPI, Neuropsychiatric Inventory

eTable 4. Characteristics of Sensory Garden and Horticultural activities for behavioural disturbances in patients with dementia

Primary study	*Study design*	*Population*	*Type of intervention, dose, route of administration, frequency and duration in active group*	*Outcome measures*	*Results*
Calkins 2007 (20)	Pre-post	N=17 nursing home residents	Garden	Agitation (CMAI), sleep	No results were available
Cohen-Mansfield 1998 (21)	Pre-post	N=12 nursing home residents	Garden	Mood, Agitation (CMAI)	Statistically significant decrease in physically non-aggressive and aggressive behaviours
Connell 2007(22)	RCT	N=20 nursing home residents	Horticultural therapy	Agitation (CMAI), sleep	Non-statistically significant effects on aggression and physical and verbal agitation
Detweiler 2008(23)	Pre-post	N=34 Dementia Units residents	Garden	Inappropriate behaviours (CMAI)	Statistically significant decline in total CMAI
Jarrott and Gigliotti 2010(24)	RCT, cluster randomized	N=129 with dementia, female not specified, mean age not specified, control group: traditional activities	Horticultural activities for at least 25 minutes, but neither frequency nor total duration specified	Affect (AARS); social engagement (MPES)	No difference in affect.
Luk 2011(25)	RCT	N=14 nursing home residents	Horticultural activities were conducted outside for 30 mins twice per week.	Agitation (CMAI)	Non- significant decline in aggressive and non-aggressive behaviour and CMAI
Vuolo 2003(26)	Pre-post	N=50 NH residents	Horticultural therapy	Agitation	Statistically significant reduction in physically non-aggressive behaviour

AARS, Apparent Affect Rating Scale; CMAI, Cohen-Mansfield Agitation Inventory; MPES, Menorah Park Engagement Scale;

eTable 5a. Music therapy for behavioural disturbances in patients with dementia

Primary study	*Study design*	*Population*	*Type of intervention, dose, route of administration in active group*	*Outcome measures*	*Results*
Choi 2009(27)	CT	N=20; mean age 75, dementia (Alzheimer's, vascular, other)	Singing song, analysis of libretto, making musical instruments, playing piano and hand bells, song drawing and writing; 50 min/3x per week for 5 weeks;	MMSE, GDS, Gqol,NPI-Q	Reduced behavioural symptoms and depression
Clark 1998(28)	RCT	N=18; all types of dementia	Listening to music individually, 2 weeks duration,	Agitation (unclear checklist)	Decrease in the total number of observed behaviours; improved affect
Cooke 2010 (29)	RCT	N=24; early to mid-stage dementia	Singing, playing music, listening to music in a group, 8 weeks,	GDS	
Goka 2005 (30)	CT	N=22; mean age 78, mild to moderate Alzheimer's dementia	Combined music and reminiscence therapy. Singing songs associated with memories of the participants; 60 min/1x per week for 10 weeks;	MMSE, HDS-R,DAD, NPI, TORS	non statistically significant reduction of behavioural symptoms
Groene 1993 (31)	RCT	N=30, , mean age 78, Alzheimer's dementia	Listening, playing percussion instruments, singing, movement or dance. Music based on personal references; 7 sessions, 15 min each;	Wandering behaviour, seating/proximity behaviour, MMSE	no change in wandering behaviour
Guétin 2009(32)	RCT	N=30, , mean age 86, mild to moderate Alzheimer's dementia	Listened to music based on participants' music preferences via headphones; 20 min/1x per week for 24 weeks; control group: rest and reading	Hamilton Scale, GDS	reduced depression
Ikeda 2006(33)	RCT	N=12, , mean age 86, severe senile dementia	One on one rhythm exercise. Shake hands and clap in rhythm to music based on participant's music preferences with a familiar song; 15 min/5x per week for 7 weeks;	MMSE, GBS,ROM-T, D-EMS	non statistically significant reduction of depression
Irish 2006(34)	CT, repeated measures	N=10 with mild Alzheimer's dementia	Listening to classical music individually, 2 weeks,	State-Trait Anxiety Inventory	
Ledger 2007(35)	CT	N=45, , mean age 85, mild to moderate senile Alzheimer's dementia	Listening to music played by the therapist, singing, playing instruments, moving to music and discussing feelings and memories; 30-45 min/1x per week for at least 42 weeks to 1 year;	CMAI-long	non statistically significant increase of behavioural symptoms
Mihara 2004(36)	CT	N=19, , mean age 86, dementia	Greeting, gentle stretching exercise and breath control, singing familiar music, playing a musical instrument and rhythm activity; 30-45 min/1x per week for 8 weeks;	AR-MCL, TORS,JSS-D, JSS-E, VI	non statistically significant reduction of depression
Miura	CT	N=31, , mean age 78, mild	Opening song, rhythm exercise, singing, music	BI, GDS, MMSE,SKT,	non statistically

2005(37)		Alzheimer's, vascular, frontotemporal and Lewy body and other dementia	appreciation and reminiscence; <60 min/1x per week for 8-10 weeks;	ZBI, SPECT,D-EMS	significant increase of depression
Nair 2010 (38)	Randomized, cross-over	N=37,	Listening to classical music in a group, 12 weeks duration,	Behavior chart	
Hokkanen 2008 (39)	RCT	29 nursing home residents, female 22, mean age 82, dementia (Alzheimer's, vascular, other)	Dance movement therapy; 30-45 min/1x per week for 9 weeks; control group: regular nursing home activities	The word list savings score; Clock drawing test; Cookie Theft; NOSGER	No change in behaviours.
Raglio 2008 (40)	RCT	N=59, , mean age 85, Alzheimer's, mixed and vascular dementia	Singing and body movement with music to promote communication; 30 sessions of 30 min/session for 16 weeks; control group: educational and entertainment activities	MMSE, BI, NPI,MTCS	reduction of behavioural symptoms ; non statistically significant reduction of depression
Raglio 2010(41)	RCT	N=20, female 15, mean age 86	Improvisation-based music therapy: two 30-minsession/week for15 weeks; control group: educational and occupational activities	NPI	NPI: no change; NPI sub-score: depression improved
Raglio 2010 (42)	RCT	N=60, female 55, mean age 85, Alzheimer's, mixed and vascular dementia	Patients and music therapist express their emotions playing musical instruments and interacting; 30 min/3x per week for 12 weeks; control group: educational support and entertainment activities	NPI	non statistically significant reduction of behavioural symptoms and depression
Remington 2002 (43)	RCT	N=34, , mean age 82, mild to severe senile dementia	Listening to music with a slow tempo via a por**table** CD player; 1 session for 10 min;	CMAI	reduced behavioural symptoms
Sung 2006a(44)	RCT	N=36, , mean age 78, dementia	Body and limb movement to participant's familiar music with moderate tempo via a CD player; 30 min/2x per week for >4 weeks; control group: usual care	CMAI	non statistically significant reduction of behavioural symptoms
Sung 2006b(45)	RCT	N=57, , mean age not reported, dementia	Listened to music based on personal references; 30 min/2x per week for 6 weeks;	CMAI	reduction of behavioural symptoms
Sung 2010(46)	CT	N=52, , mean age 80, moderate and severe senile dementia	Listened to music based on participant's music preferences in via CD players; 30 min/2x week for >6 weeks;	Anxiety (RAID)	preferred music listening reduced significantly the anxiety score at six weeks ($F = 12.15$, $p = 0.001$)
Suzuki 2004(47)	CT	N=23, , mean age 84, Alzheimer's and vascular dementia	Opening song, singing songs based on personal references, playing hand-held drums; 60 min/2x per week for 8 weeks;	MOSES	MOSES: 'irritability' sub-score improved significantly
Suzuki 2007(48)	CT	N=16, , mean age 86, Alzheimer's and vascular dementia	The greeting song, singing songs from subjects' historical background and preference, hand-bell performance, and listening to flute and piano; 60	BEHAVE-AD	non statistically significant reduction of behavioural symptoms

			min/2x per week over 3 months (25 sessions);		and depression
Tuet 2006(49)	CT	N=16, age range 84-104, moderate to severe senile dementia	Listening to songs accompanied by different kinds of musical instruments, singing songs, playing exercise with listening to songs and playing musical instruments. Music was relaxing western and Chinese traditional music; 45 min/3x per week for 3 weeks	CMAI, NPI	reduction of behavioural symptoms
Van de Winckel 2004 (50)	RCT	N=25, mean age 82, Alzheimer's and multiple infarct dementia	Exercise training with music adapted to the age-range of the participants; 30 min daily for 3 months;	BOP scale	Non statistically significant increase of behavioural symptoms

BEHAVE-AD, Behavior Pathology in Alzheimer's Disease Rating Scale; BOP, Beoordelingsschaal voor Oudere Patient/Evaluation Scale for Elderly; CMAI, Cohen-Mansfield Agitation Inventory; CHF, congestive heart failure; CT, Controlled clinical trial; HRV, heart rate variability; MOSES, Multidimensional Observation Scale for Elderly Subjects; NPI, Neuropsychiatric Inventory; RCT Randomized controlled trial; RAID, Rating Anxiety in Dementia

Table 5b. Dance therapy for behavioural disturbances in patients with dementia

Primary study	*Study design*	*Population*	*Type of intervention, dose, route of administration in active group*	*Outcome measures*	*Results*
Hokkanen 2008	RCT	N=29 nursing home residents, female 22, mean age 82, dementia (Alzheimer's, vascular, other)	Dance movement therapy; 30-45 min/1x per week for 9 weeks; control group: regular nursing home activities	The word list savings score; Clock drawing test; Cookie Theft; NOSGER	No change in behaviours.

NOSGER (Nurses' Observation Scale for Geriatric Patients)

eTable 6. Snoezelen Multisensory Stimulation Therapy for behavioural disturbances in patients with dementia

Primary study	*Study design*	*Population*	*Type of intervention, dose, route of administration in active group*	*Outcome measures*	*Results*
Baker 2001 (51)	Randomized trial	N=50 subjects with Alzheimer's disease, vascular dementia or mixed diagnosis; mean age 78; female 25	Eight standardized multi-sensory programs.	INTERACT (22-item); INTERACT (12-item); Carry-over and long-term effect Behavioral: REHAB (general behaviour subscale and deviant behaviour subscale) Behavior Rating Scale (BRS) of CAPE	No significant effects on any scale of behavioural symptoms were found either immediately after intervention or at one-month post-follow-up
Baker	Randomized	N=136 subjects diagnosed with	Eight multi-sensory	INTERACT (22-item); INTERACT	There were no longer-term

2003 (52)	trial	Alzheimer's, vascular or mixed dementia; mean MMSE scores snoezelen group (9.4) and the control group (6.7) (p=0.01)	programs	(12-item); Carry-over and long-term effect Behavioral: REHAB (general behaviour subscale and deviant behaviour subscale) Behavior Rating Scale of CAPE	treatment effects of the integrated snoezelen-care program on behaviour.
van Weert 2005 (53)	CT	N=125, female 101, mean age 84, dementia (DSM-III-R)	Snoezelen; 18 months, control group non specified	CMAI (Cohen-Mansfield Agitation Inventory);	Improvement in intervention group for short term period but not for long follow-up

DSM, Diagnostic and Statistical Manual of Mental Disorders

eTable 7. Transcutaneous electrical nerve stimulation therapy for behavioural disturbances in patients with dementia

Primary study	*Study design*	*Population*	*Type of intervention, dose, route of administration in active group*	*Outcome measures*	*Results*
Hozumi 1996 (54)	Randomized, double-blind, placebo-controlled Country: Japan	N=27 subjects with multi-infarct dementia with irregular sleep-wake patterns and nocturnal behaviour disorders and/or delirium; 15 female; age 58 - 86 Inpatients	Stimulator type: HESS-10 Waveform: rectangular pulses Frequency: 6 - 80 Hz Pulse duration: 0.2 ms maximum, rms of 256 microA Amplitude: 6 - 8 V Electrode location: transcranial with electrodes attached to the "forehead and inion with a head-band" Treatment duration: 20 minutes daily for 2 weeks Placebo treatment: same as experimental but electrodes disconnected from the device.		Behavior disorder improved $p < 0.05$
Scherder 1998 (55)	Randomized, double-blind, placebo-controlled Country: Holland	N=18 subjects in a residential home. mean age 82 (70 – 91); Shortened MMSE mean 4.4/12. 7 or less/12 on this scale, (equivalent to 17 or less/20 on regular MMSE) classifies patients as having serious cognitive disturbances. NINCDS-ADRDA criteria	Stimulator type: Premier 10s Waveform: asymmetric biphasic square wave, Burst mode Frequency: Bursts of trains, 9 pulses/burst, pulse freq 160Hz, burst freq 2 Hz Pulse duration: 100 microsec. Amplitude: Visible muscle twitches Electrode location: Two 2 x 3 cm electrodes between T1 and T5 on 2cm from the spine. Treatment duration: 30 min/day, 5 days/week, 6 weeks Placebo intervention: Same as experimental except no current delivered.	BOP scale	Behavioral disorder not improved
Scherder 1999 (56)	Randomized, double-blind, placebo-controlled Country: Holland	N=18 subjects, 9 expt, 9 control Lived in a residential home for elderly people. Age: 70 - 91yrs, mean 81.7 Shortened MMSE mean 4.4/12. 7 or less/12 on this scale, (equivalent to 17 or less/20 on regular MMSE) classifies patients as having serious cognitive disturbances. Met NINCDS-ADRDA criteria for clinical diagnosis of dementia of Alzheimer's type, GDS stage 6 (mid-stage) with symptoms present at least 6 months, all scored 17 or less	Stimulator type: Premier 10s Waveform: asymmetric biphasic square wave, Burst mode Frequency: Bursts of trains, 9 pulses/burst, pulse freq 160Hz, burst freq 2 Hz Pulse duration: 100 microsec. Amplitude: Visible muscle twitches Electrode location: Two 2 x 3 cm electrodes between T1 and T5 on 2cm from the spine. Treatment duration: 30 min/day, 5 days/week, 6 weeks Placebo intervention: Same as experimental	BOP scale	Behavioral disorder not improved

		on Hamilton Rating Scale for Depression. Exclusion: history of psychiatric disorder, alcoholism, cerebral trauma, cerebrovascular disease, hydrocephalus, neoplasm, infection, epilepsy, disturbances of consciousness, focal brain abnormalities, pacemaker.	except no current delivered.		
Scherder 1999 (57)	Randomized, double-blind, placebo-controlled Country: Holland	N=15 subjects, 8 experimental, 7 control (16 initially, one from the control group did not tolerate the actigraphic assessment and was therefore excluded from the study) Lived in a residential home for elderly people. Shortened MMSE mean 4.4/12. 7 or less/12 on this scale, (equivalent to 17 or less/20 on regular MMSE) classifies patients as having serious cognitive disturbances. Met NINCDS-ADRDA criteria for clinical diagnosis of dementia of Alzheimer's type, GDS stage 6 (midstage) with symptoms.	Stimulator type: Premier 10s Waveform: asymmetric biphasic square wave, Burst mode Frequency: Bursts of trains, 9 pulses/burst, pulse freq 160Hz, burst freq 2 Hz Pulse duration: 100 microsec. Amplitude: Visible muscle twitches Electrode location: Two 2 x 3 cm electrodes between T1 and T5 on 2cm from the spine. Poles switched daily. Treatment duration: 30 min/day, 5 days/week, 6 weeks Placebo intervention: Same as experimental except no current delivered.	Rest–activity rhythm (assessed using actigraphy)	Improvement in the rest–activity rhythm
Scherder 1999 (58)	Randomized, double-blind, placebo-controlled Country: Holland	Lived in a residential home for elderly people. Meeting NINCDS-ADRDA criteria for clinical diagnosis of probable demetia of Alzheimer's type. Studies 1-3: early stage of AD (stage 5 of GDS) Study 4: mid-stage of AD (stage 6 of GDS)	Stimulation not described except that Premier 10s stimulator used. Study 1: TENS for 6 hours/day, therapist present throughout Study 2: TENS for 30 min/day, therapist present throughout Study 3: TENS without therapist present (called "isolated TENS" in the report), duration of treatment not indicated. Study 4: no description of TENS intervention given. Therapist present.	BOP scale	No improvement in behavioural disturbances Behavioural disorder not improved
Scherder 2000 (59)	Randomized, double-blind, placebo-controlled Country: Holland	20 subjects, 10 experimental, 10 control Institutionalized elderly persons 17 F, 3 M Age: 82-91 yrs, mean 86.9 Inclusion criterion for shortened MMSE 8 - 12/12, BUT a range of 7 - 11, mean of 9.4 described for the experimental group, range 8 - 12, mean 9.7 for controls.	Stimulator type: Premier 10s Waveform: asymmetric biphasic square wave, Burst mode Frequency: Bursts of trains, 9 pulses/burst, pulse freq 160Hz, burst freq 2 Hz Pulse duration: 100 microsec. Amplitude: Visible muscle twitches Electrode location: Two 2 x 3 cm electrodes	BOP scale	Need of help subscale only: ns Behaviour inventory: ns

			between T1 and T5 on 2cm from the spine. Poles switched daily. Treatment duration: 30 min/day, 5 days/week, 6 weeks Placebo intervention: Same as experimental except no current delivered.		
Scherder 2002 (60)	Randomized, double-blind, placebo-controlled Country: Holland	18 subjects, 9 expt, 9 control Institutionalized elderly persons. Mean age: experimental group 87.1, control group 87.67. Mean education: experimental group 3.11, control group 2.88. MMSE experimental group 18.33, control group 19.67. All met NINCDS-ADRDA criteria for the clinical diagnosis of probably AD and stage 5 of the GDS.	Stimulator: Alphastim 100 Waveform: Bipolar asymmetric rectangular waves, Frequency: 0.5 Hz Pulse duration: not given Amplitude: 10 - 600 microA, to just below reported sensation of tingling and/or dizziness or to maximum if no sensation experienced. Electrode Placement: clipped to the earlobes. Treatment duration and frequency: 30 minutes/day between 1500 and 1900 h, 5 days/week, 6 weeks. Placebo intervention: Same as for the experimental group except no current administered.	BOP scale	No improvements or treatment effects on Affective, independent & psychogeriatric behaviour
Scherder 2003 (61)	Randomized, double-blind, placebo-controlled Country: Holland	16subjects, 8 expt, 8 control Lived in a residential home for elderly people. Age: 70 - 91yrs, mean 81.7 Shortened MMSE mean 4.4/12. 7 or less/12 on this scale, (equivalent to 17 or less/20 on regular MMSE) classifies patients as having serious cognitive disturbances. Met NINCDS-ADRDA criteria for clinical diagnosis of dementia of Alzheimers type, GDS stage 5 (midstage) with symptoms present at least 6 months	Stimulator type: Premier 10s 1. Stimulator: Alphastim 100 Waveform: Bipolar asymmetric rectangular waves, Frequency: 0.5 Hz 30mins/day, 5 days a week 2.control appeared the same with electrodes but no current	Rest–activity rhythm (assessed using actigraphy)	No improvement in the rest–activity rhythm
Van Someren 1998 (62)	Randomized, double-blind, placebo-controlled Country: Holland	14 subjects 13 F, 1 M Nursing home patients. Diagnosed with early stage probable AD NINCDS-ADRDA Age mean 84 +/- 1.5 Dutch cognitive screening test: mean 10.2 +/- 0.4(= approx 18 on MMSE);	Stimulator type: Premier 10s Waveform: asymmetric biphasic square wave, Burst mode Frequency: Bursts of trains, 9 pulses/burst, pulse freq 160Hz, burst freq 2 Hz Pulse duration: 100 microsec.	Rest–activity rhythm (assessed using actigraphy)	Improvement in the rest–activity rhythm

		(initial sample of 19, 14 completed), 6 treated, 8 placebo;	Amplitude: Visible muscle twitches Electrode location: Two 2 x 3 cm electrodes between shoulder blades. Treatment duration: 30 min/day, 5 days/week, 6 weeks Placebo intervention: Same as experimental except no current delivered.		

BOP, Beoordelingsschaal voor Oudere Patient/Evaluation Scale for Elderly; GDS, Global Deterioration Scale; MMSE, Mini-Mental State Examination; NINCDS-ADRDA, National Institute of Neurological and Communicative Disorders and Stroke and the Alzheimer's Disease and Related Disorders Association

eTable 8. Characteristics of cognitive stimulation-based interventions for behavioural disturbances in patients with dementia

Primary study	*Study design*	*Population*	*Type of intervention, dose, route of administration, frequency and duration in active group*	*Outcome measures*	*Results*
Baines 1987 (63)	Cross-over, randomized trial	15 residents living in care home, female 14; Mean age=81.5. 'Moderate to severe Impairment of cognitive functioning'	Reality orientation (*board and discussion of current orientating information through newspapers, photographs, calendars and clocks etc., with materials selected to stimulate all five senses*) Reminiscence therapy	Behavior: BRS	No significant difference between the groups in terms of the behavioural disturbances
Chapman 2004 (64)	Randomized controlled trial	donepezil-plus-stimulation group; n = 26; donepezil-only group; n = 28. mild to moderate Alzheimer's disease (AD; Mini-Mental Status Examination score of 12- 28); 54 to 91 years	cognitive-communication stimulation in combination with donepezil	NPI	A group x time interaction for the stimulation plus donepezil- group on irritability compared with the donepezil-only group.
Ferrario 1991 (65)	Randomized controlled trial	19 elderly residents; female 8; mean age 82 Subjects with cognitive disturbances - MMSE range 18-25	Reality orientation	Behavior problems: MOSES - irri**table**, withdrawn Mood: MOSES	No significant difference

Onder 2005 (66)	3-arm, randomized controlled trial	156 home residents with probable Alzheimer's Disease on Donepezil treatment for at least 3 months; female 113; mean Age 75.8; MMSE 20.1 (sd 3.1)	Current information, topics of general interest, historical events and famous people, attention, memory and visuo-spatial	Behavior problems: NPI	No significant difference
Niu 2010 (67)	randomized, controlled, rater-blind clinical trial	32 patients with mild to moderate Alzheimer's disease showing marked BPSD	Cognitive stimulation focused on tasks requiring executive functions and working memory	NPI	Change in Neuropsychiatric Inventory total score (MD -2.06 (95% CI -2.91 to -1.21, P<0.001)
Spector 2001 (68)	Randomized controlled trial	35 patients in day centers and residential homes; moderate dementia; MMSE: 11.5±4.4 for intervention group; 15.5±4.4 for control group); mean age: 85.7±6.7	Intervention: mixture of reality orientation and other Cognitive learning exercises (15 sessions twice weekly,45 min/session) Control: usual care	BRS	No statistical difference between the two groups
Spector 2003 (69)	Randomized controlled trial	201 patients in residential homes or day centers; moderate dementia; (MMSE: 14.4±3.8); Mean age: 85.3±7.0	Intervention: mixture of reality orientation and other cognitive stimulation exercises (14 sessions twice weekly, 45 min/session) Control: normal activities	Mood: CSDD, RAID; Behaviour: BRS, (CAPE).	No statistical difference between the two groups
Tadaka 2004 (70)	Randomized controlled trial	60 community-dwelling older adults with dementia; mean age 83	Intervention: reminiscence and reality orientation (1.5h once-a-week, for 10 weeks)	MOSES	No effect reported on irritability or depression

Wallis 1983(71)	Randomized controlled trial	38 long-stay residential patients: mean age: 71.8±16.6 for intervention group; 68.0±15.4for control group Severe dementia (RCP mental scale: 34.5±29.9 for intervention group; 37.6±28.9 for control group)	Intervention: reorientation therapy (5 times a week,30 min/session for 3 months) Control: occupational therapy, + both individual and group activities	CBRS	No statistical difference between the two groups

BRS, Behavioral Rating Scale; CSDD, Cornell Scale for Depression in Dementia; CBRS, Crichton Behavior Rating Scale; MOSES, Multidimensional Observation Scale for Elderly Subjects; MMSE, Mini-Mental State Examination; NPI, Neuropsychiatric Inventory; RAID, Rating Anxiety in Dementia

eTable 9 . Reminiscence therapy for behavioural disturbances in patients with dementia

Primary study	*Study design*	*Population*	*Type of intervention, dose, route of administration in active group*	*Outcome measures*	*Results*
Deponte 2007 (72)	*Randomized trial*	N=30, mean age 86.8; dementia diagnosis (unspecified)	Sensorial reminiscence, 3 months	NPI	Unclear
Haight 2006 (73)	Pre-post design, randomized controlled trial	N=31, female?, age range 60-99, dementia	Life review/life story book sessions; 1 hr/1x per week for 8 weeks	CSDD; Alzheimer's mood scale; functional independence scale; communication observation scale; memory and behaviour problems checklist	Significant change in depression, communication, positive mood
Haslam 2010 (74)	Pre-post design, randomized controlled trial	N=73, female?, age range (dementia) 62-93, dementia and non-dementia	Discussion and conversation; 30 min/1x per week for 4 weeks	Addenbrooke's cognitive examination - revised; HADS;	Group reminiscence enhanced memory performance.
Lai 2004 (75)	Pre-post design, randomized controlled trial	N=101, female?, mean age 86, dementia	Stimulate recall during conversation with life story book; 30 min/1x per week for 6 weeks	Social engagement scale, well-being/ill-being scale	Psychosocial well-being improved significantly in the intervention group.
Morgan 2010 (76)	Pre-post design, randomized controlled trial	N=17, female?, mean age 83, dementia	Life review/life story book sessions; 30 min-1 hr/1x per week for 8-12 weeks	GDS; autobiographical memory interview	Improved autobiographical memory and reduced depression
Politis 2004 (77)	Pre-post design, randomized controlled trial	N=36, female?, mean age 84, dementia	Generating questions from a geriatrics network kit and using the responses of participants to initiate conversations; 30 min/3x per week for 4 weeks	NPI, NPI-apathy, Alzheimer's disease-related quality-of-life scale;	No difference between intervention and control groups on NPI and NPI-apathy
Wang 2009 (78)	Randomized trial	N=77, female 37, mean age 79; mild-moderate dementia (clinical dementia rating)	Structured group reminiscence therapy;1x per week for 8 weeks	CAPE-BRS	No difference between intervention and control groups

CAPE-BRS, Clifton Assessment Procedures for the Elderly–Behavioral Rating Scale; CSDD, Cornell Scale for Depression in Dementia; GDS Geriatric depression scale; HADS, hospital anxiety and depression scale; NPI Neuropsychiatric Inventory

eTable 10. Validation therapy for behavioural disturbances in patients with dementia

Primary study	*Study design*	*Population*	*Type of intervention, dose, route of administration in active group*	*Outcome measures*	*Results*
Peoples 1982 (79)	RCT	N=31, female 23, mean age 88	A group leader, song leader or hostess was identified. Activities included discussion on a previously agreed topic, singing and movement activity, and a closing ritual followed by refreshments.; 30 min/1x per week for 6 weeks; control groups: reminiscence therapy and usual care	BAT; TADCE	Behavior improved at 6 weeks.
Robb 1986 (80)	RCT	N=36 (N=25 with dementia), female?, mean age 80.5	Details of the Validation therapy were not reported; 2x per week for 9 months; control group: usual treatment (e.g. medication)	MSQ; PGCMS; MSBS	No effects detected.
Toseland 1997 (81)	RCT	N=88, female 66, mean age 87.6; moderate level of dementia (SPMSQ and VSI)	Four sessions, 5-10 minutes each. Session 1. Introductions, greetings and singing. Session 2. Interaction on a topic of interest, reminiscing encouraged. Session 3. Program activity, singing or poetry. Session 4. Refreshments and individual good byes.; 30 min/4x per week for 52 weeks; control groups: social contact group and usual care	CMAI; MOSES; GIPB;	Depression decreased in validation therapy group.

BAT, Behavior assessment tool; CMAI, Cohen Mansfield Agitation Inventory; GIPB, Geriatric Indices of Positive Behavior; MOSES, Multidimensional Observation Scale for Elderly Subjects; MSBS,, Minimal Social Behavior Scale; MSQ, Mental Status Questionnaire; PGCMS, Philadelphia Geriatric Center Morale Scale; SPMSQ, Short Portable Mental Status Questionnaire; TADCE, Tool for Assessing the Degree of Confusion in the Elderly; VSI, Validation Screening Instrument)

eTable 11. Simulated presence therapy for behavioural disturbances in patients with dementia

Primary study	*Study design*	*Population*	*Type of intervention, dose, route of administration in active group*	*Outcome measures*	*Results*
Camberg 1999 (82)	Latin-square, double-blind	N=54, , mean age 83,	Audiotape prepared by a family member or a surrogate	SOAPD, visual analog scales, positive affect scales, facial diagrams of mood,	No significant difference for agitation and mood.
Cheston 2007(83)	within-subjects	N=6, , age range 75-91,	Audiotape prepared by participant's spouse	PRS	
Cohen-Mansfield 1997(84)	CT	N=32, , mean age 87,	Videotape prepared by family members or researchers	CMAI, tape recordings and standardized observations for verbally disruptive behaviours	Verbally disruptive behaviours decreased by 46% during the videotape, and 16% during the no-intervention.
Garland 2007 (85)	RCT (single blind)	N=30, , age range 66-93,	Audiotape prepared by a family member and a psychologist	CMAI	Behavioral symptoms significantly reduced in favor of active intervention
Miller 2001 (86)	quasi-experimental	N=7, , age range 68-89,	Audiotape prepared by a family member	HRS (first 4 items)	Significant decline in agitation level
Peak 2002(87)	N-of-1 trials (4 cases studied)	N=4, , age range 64-84,	Audiotape prepared by participant's spouse	modified PRS	For two of the four people presented here, SPT improved levels of some of the observed behaviours
Woods 1995(88)	quasi-experimental	N=8, , age range 71-97,	Audiotape prepared by caregiver	DBRS	Disruptive behaviour reduced in active treatment group

CMAI, Cohen-Mansfield Agitation Inventory; DBRS, Disruptive Behavior Rating Scale; HRS, Haycox Rating Scale; PRS, Positive Response Schedule for Severe Dementia; SOAPD, Scale for the Observation of Agitation in Persons with Dementia;

eTable 12. Characteristics of Primary studies that assessed Behavioral Management Techniques for behavioural disturbances in patients with dementia

Primary study	*Study design*	*Population*	*Type of intervention, dose, route of administration, frequency and duration in active group*	*Outcome measures*	*Results*
Burgio 2003 (89) *(care giver based)*	Randomized controlled trial	Participants with dementia: mean MMSE score 14.53 for white participants and 10.98 for African American participants, with a mean age of 78.83; 70 white + 48 African American primary caregivers	Caregiver Skill Training Intervention based on a manual	RMBPC	No statistical difference between the groups.
Burns 2003 (90) *(care giver based)*	Randomized controlled trial	167 Dyads; 66 caregivers	Active group: REACH intervention: behaviour care (individualized educational program on BMT) + individualized care giver stress– coping management training in 8 face-to-face sessions and 30 telephone calls over 24 months Control group: behaviour care only.	problem behaviour: RMBPC.	Significant improvement in caregiver bother associated with care recipient behaviours;
Chenoweth 2009 (91) *(care giver based)*		289 residents (15 residential homes) with need-driven behaviours, mean age: 85 years.	Caregiver training and support intervention in either: Person-Centred Care or Dementia Care Mapping	CMAI, NPI, QUALID, QUIS	Significant reduction in agitation
Farran 2004 (92)*(care giver based)*	Randomized controlled trial	295 participants with AD or dementia; MMSE < 24, mean MMSE score: 12.6	Intervention: Caregiver skill. Control: Information and Support Orientated Group Intervention	BMS-R, RMPBC	No statistical differences between the two groups
Fossey 2006 (93)	Cluster randomized controlled trial	346 residents with dementia (12 residential homes); mean age: 82 years.	Active group: Training and Support Intervention for nursing home staff. Control group: treatment as usual	CMAI	No statistical difference (mean difference 0.3, −8.3 to 8.9; P = 0.94).

Gitlin 2001 (94)	Randomized clinical trial		Active group: Education about dementia and impact of home environment on behavioural problems and activities of daily living deficits; instruction in problem solving and developing strategies, to manage caregiving concerns: Control group: usual care	-Frequency of behavioural problems: MBPC + 4 other behaviours; -caregiver distress associated with behavioural problems - caregiving self-efficacy assessed by care givers	No effects on frequency of care recipient behavioural problems (intervention 20.25-17.2; control 18.74-14.43);
Gitlin 2003 (95) *(care giver based)*	Randomized clinical trial	255 ITT care givers;190 IA at6mth;	Active group: Home environmental skill building program over 5, 90-min home visits and 1, 30-mintelephone contact: education, and physical and social environment modifications; similar to (44) (Philadelphia REACH) Control group: usual care(information only)	- Number of disruption-related behaviours: modified RMBPC presence or absence of behaviours rather than frequency; - care giver upset with disruptive behaviours: RMBPC	No change in disruptive behaviours for care recipients (intervention 2.14-1.88; control 2.16-1.96);
Gonyea 2006 (96)*(care giver based)*	Randomized controlled trial	80 participants with Alzheimer's disease; mean age: 77; 80 caregivers, mean age 64 years,	Active group: Caregiver group based training intervention (Project CARE); Control group: Psychoeducational control group using similar structure to the intervention group.	NPI - severity and distress	No statistical difference for severity of problem behaviours (-0.24 [-0.68 to 0.20]).
Gormley 2001 (97) *(caregiver based)*	Controlled clinical trial	62 participants with dementia; mean age 76 years, average MMSE score 13.3; 62 caregivers mean age was 68; predominantly female.	Active group: Education and aggressive behaviour management training program for care giver in 4 in-home sessions over 8 weeks Control group: discussions with care giver and care recipient on a variety of non- specific care-related issues and advice on services.	a) Overall symptomatology and severity of behavioural problems: BEHAVE-AD; b) care recipient aggressive behaviour: Rating Scale for Aggressive Behavior in the Elderly	- no difference in overall behavioural problems (intervention8-6.5; control 8-7.8); - no diff in patient's aggressive behaviour (intervention 9.4-6.9; control 8.8-8.6);

Graff 2007 (98)	Randomized clinical trial	135 ITT dyads; 132 IA	Active group: Occupational therapy in 10 sessions over 5 weeks: therapist taught care recipient to use compensatory and environmental strategies to improve their performance of daily activities and care giver trained by means of cognitive behavioural treatment. Control group: waitlist	CSDD- care recipient mood	Significantly improved care recipients' mood (intervention 8.3 -6.2; control 8.1-9.2).
Huang 2003 (99) *(care giver based)*	Randomized clinical trial Northern Taiwan.	48 participants with dementia (and their family caregiver); predominantly female; mean age of 76years; mean MMSE score 13.1. (care givers predominantly female, mean age 56)	Active group: a home-based Caregiver Training Program; Control group: written materials only	Chinese version of CMAI (care recipient Frequency of problem behaviours and caregiver self-efficacy).	No statistical difference in agitation
Losada-Baltar 2004(100) *(care giver based)*	Randomized clinical trial Spain	31 participants with dementia; mean age80	Active group: Caregiver Problem-Solving Skills Training Intervention Control group: usual care	MBCL - frequency and reaction	No statistical difference for the outcome frequency of problem behaviours0.20 [-0.91 to1.30]
Marriott 2000 (101) *(care giver based)*	3-arm, controlled clinical trial	42 dyads	care giver education, stress management and skills training to manage behaviour of care recipient and coping with change; 1 session every 2 weeks, for a total of 14 sessions. Control groups: one group received one type of dyad interview, which was also used in the treatment group, and another control group did not receive any interview.	Change in BPSD: a) depressive symptoms: CSDD; b) behavioural disturbances and c) psychotic symptoms: MOUSEPAD	At post-treatment, behavioural disturbances significantly decreased, but no significant effects at follow-up.
Mador 2004 (102)	Randomized clinical trial	71 patients with dementia in **hospital** setting; mean age 83	Active group: Staff Training Hospital Behavior Advisory Service Usual Care	PAS	Worsening of severity of problem behaviours at post-intervention (SMD 0.89 [0.41-1.38])

McCurry 2005 (103) *(care giver based)*	RCT	36 dyads	Nighttime Insomnia Treatment and Education for Alzheimer's Disease and training care givers to implement treatment; six, 1-hour sessions at home, over 2-months. Control group: general dementia education and care giver support	Night time and sleep behaviour, daytime sleepiness and depression (RMBPC) of care recipients	The number of awakenings and the total time awake at night, as well as daytime sleepiness, all significantly diminished. Depression was significantly reduced post-intervention, but not at 6-month follow-up.
Moniz- Cook 2008 (104) *(care giver based)*	Controlled clinical trial	113 dyads	caregivers assisted by community mental health nurses to manage problematic behaviour of dementia patients and to cope with stress; home visits 1x/week for 4 weeks plus addition contact as needed over 18 months. Control group: usual care	Frequency of problem behaviour and difficulty managing problematic behaviour by care giver: adapted-Gilleard Problem Checklist	Problem behaviours significantly decreased over 18 months, but a post-hoc analysis demonstrated the effect was dependent on care managers.
Nobili 2004 (105) *(care giver based)*	RCT	69 dyads	A psychologist (60 min visit) and an occupational therapist (90 min visit) gave information and advice to care givers; Control group: helpline and information on community services and legal and economic features of caregiving	Frequency of problem behaviours in care recipient: Spontaneous Behavior Interview – Section C.	Problem behaviours and frequency of delusions significantly decreased.
Proctor 1999 (106)	Randomized trial	105 participants with dementia(in 12 nursing and residential homes); mean age of 83	Active group: Staff training and Education Intervention including psychosocial management of resident's behavioural problems; Control group: usual care	CRBRS	No statistical difference for the outcome severity of problem behaviours (-0.02 [-0.41 to 0.36])
Teri 1997(107)	RCT	72 dyads	Two behavioural therapy interventions. One comprised education and discussing and planning strategies to manage problem behaviour and to maximize cognitive function of the care recipient (increase pleasant events plus self-care strategies). The other intervention included the aforementioned elements, but substituting problem solving for the pleasant events; 60-minsession, 1x/week for 9 weeks: Control groups: usual care and wait-list control.	HDRS, CSDD and BDI	Depression significantly improved with both behavioural interventions. No significant difference between either active treatment.

Teri 2003 (108) *(care giver based)*	RCT	153 dyads	Exercise for care recipients and care givers taught behavioural management techniques and given education on dementia; 12 hour sessions 2x/week for 3 weeks, followed by sessions 1x/week for 4 weeks, then sessions 2x/week for 2 weeks. Control group: usual care	HDRS, CSDD and RMBPC	Depression significantly reduced at 3 months, but no significant difference at 24 months. (Care recipients with higher initial depression maintained improvements.) Trend for significantly decreased institutionalization due to problem behaviours at 24 months.
Teri 2005 (109)*(care giver based)*	Controlled clinical trial	95 dyads	Caregivers taught behavioural management techniques and communication strategies; increased care giver support. Pleasant events also increased for care recipients; home sessions 1x/week for 8, then monthly telephone calls for 4 months. Control group: usual care	NPI, RMBPC	Severity and frequency of behaviour problems significantly declined.
Ulstein 2007 (110) *(care giver based)*	RCT	171 dyads	caregivers taught problem solving and communication techniques, in addition to usual care; four and a half months. Control group: usual care	NPI	No significant difference in care recipient behavioural symptoms. (Post-hoc analysis revealed behavioural symptoms significantly improved in female care recipients.)

BDI, Beck Depression Inventory; BEHAVE-AD, Behavioural Pathology in Alzheimer's Disease Rating Scale; BMS-R, Behaviour Management Skill Revised; CRBRS, Crichton Royal Behavioural Rating Scale; CMAI, Cohen Mansfield Agitation Inventory; CSDD, Cornell Scale for Depression in Dementia; HDRS, Hamilton Depression Rating Scale; MBCL, Memory and Behaviour Check List; MBPC, Memory and Behaviour Problem Checklist; MMSE, Mini-Mental State Examination; NPI Neuropsychiatric Inventory; PAS, Pittsburgh Agitation Scale; QUALID, Quality of life in late stage dementia; QUIS, Quality interactions schedule; RMBPC, Revised Memory and Behaviour Problem Checklist

eTable 13. Characteristics of Multicomponent Interventions for behavioural disturbances in patients with dementia

Primary study	*Study design*	*Population*	*Type of intervention, dose, route of administration, frequency and duration in active group*	*Outcome measures*	*Results*
Brodaty 2003 (111)	RCT	N=86 with dementia, female 62, mean age 83 years, control group: usual care	1. Psychogeriatric case management: psychological, social and pharmacological treatment supervised by a geriatric psychiatrist and administered by a multidisciplinary team; one team member is case manager. 2.Psychiatric consultation: management plans provided to NH-staff and general practitioner.	AMTS, BEHAVE-AD, EBAS-DEP, FAST, CSD, NPI, SAPS, GDS, CRI, HRS-D/HAM-D, CIRS, DSM-IV	Improvement in depression and psychosis in all 3 groups
Opie 2002 (112)	RCT	N=99 with dementia, female 72, mean age 84 years	Individually tailored medical, pharmacological, psychosocial and nursing interventions targeting specific behaviours	CMAI, BAGS, GDS	Decline in restlessness, physical aggression and verbal disruption; still detectable in 75% of subjects after 1 month
Proctor 1999 (106)	RCT	N=105 with dementia, female 87, mean age 83 years	Staff training and education	AGECAT organic, AGECAT depression, Chrichton scale,	Significantly improved scores for depression and cognition
Rovner 1996 (113)	RCT	N=81 with dementia and somatic illness, female 63, mean age 82 years	Activity program, psychotropic drug management and weekly educational meetings with a psychiatrist	CMAI, PGDRS, DSM-III-R, RUGS	Significant decrease of behaviour disorders, restraint use and antipsychotic use in intervention group

AGECAT, Automatic Geriatric Examination for Computer-Assisted Taxonomy; AMTS, Abbreviated Mental Test Score; BAGS, Behaviour Assessment Graphical System; BEHAVE-AD, Behavioral Pathology in Alzheimer's Disease Rating Scale; CIRS, Cumulative Illness Rating Scale; CMAI, Cohen-Mansfield Agitation Inventory; CRI, Resident Classification Index; DSM, Diagnostic and Statistical Manual of Mental Disorders; EBAS-DEP, Even Briefer Assessment for Depression; FAST, Functional assessment Staging CSD, Cornell Scale for Depression in Dementia; GDS, Geriatric Depression Scale; HRS-D/HAM-D, Hamilton Depression Rating Scale; NPI, Neuropsychiatric Inventory; PGDRS, Psychogeriatric Dependency Rating Scale; RUGS, Resource Utilization Groups; SAPS, Scale for the Assessment of Positive symptoms

eTable 14. Exercise-based intervention for behavioural disturbances in patients with dementia

Primary study	*Study design*	*Population*	*Type of intervention, dose, route of administration, frequency and duration in active group*	*Outcome measures*	*Results*
Burgener 2008 (114)	repeated-measures randomized design	43 people with early stage dementia referred (self-referred or by the physician); female 20; mean age 77;	Multimodal intervention (Tai Chi exercise, cognitive-behavioural therapies and support group) on; Duration 1 hour x 3 times a week for 40 weeks	GDS 15	At 20 weeks: GDS increased (worsened) by 0.4 in intervention and 0.9 in control (difference not significant)
Rolland 2007 (115)	single-blind, parallel group, randomized controlled trial	134 ambulatory subjects with AD living in nursing homes	Exercise program (aerobic, strength, flexibility, and balance training). Duration 1 hour x 2 times a week for 40 weeks Walking was required for at least half of the session. A circular walking trail was created and adapted for each exercise group	MADRS	At 12 months: MADRS13.4 (+/-8.0) in intervention and 14.8 (+/-7.2)in control (difference not significant)
Teri 2003 (108)	Randomized controlled trial	153 community dwelling patients meeting National Institute of Neurological and Communicative Diseases and Stroke/Alzheimer Disease and Related Disorders Association criteria for Alzheimer disease; 63 female; mean age 78;	Combined exercise - Aerobic, endurance, strength, balance and flexibility training - and caregiver training program, Reducing Disability in Alzheimer Disease; Duration 1/2 hour x 7 times a week for 12 weeks Control group: routine medical care	CSDD	At 2 years: mean difference, 2.14; 95% CI, 0.14–4.17; p<0.04
Steinberg 2009 (116)	Randomized trial	27 home dwelling patients with Alzheimer's (MMSE>10)	Active group: Daily program of aerobic, balance and flexibility, and strength training, shown to patients and caregivers, to be done at home; Control: home safety assessment	Depression and apathy (NPI and CSDD)	No statistical difference between groups

Van de Winckel 2004 (50)	Randomized trial	25 female residents; mean age 81; NINCDS-ARDRA criteria used for probable or possible Alzheimer's disease and MMSE score lower than 24/30 (MMSE 11)	Active group: daily physical exercises (strength, balance and flexibility) supported by music for 30 min/session Duration 1/2 hour x 7 times a week for 12 weeks Control group: daily conversation	BOP scale	At 3 months: no significant difference in depressive behaviour subscale

BOP, Beoordelingsschaal voor Oudere Patient/Evaluation Scale for Elderly; CSDD, Cornell Scale for Depression in Dementia; GDS, Geriatric depression scale; MADRS, Montgomery-Asberg Depression Rating Scale; MMSE, Mini-Mental State Examination;

References

1. Akhondzadeh S, Noroozian M, Mohammadi M, Ohadinia S, Jamshidi AH, Khani M. Melissa officinalis extract in the treatment of patients with mild to moderate Alzheimer's disease: a double blind, randomised, placebo controlled trial. J Neurol Neurosurg Psychiatry. 2003;74(7):863-6.
2. Ballard CG, O'Brien JT, Reichelt K, Perry EK. Aromatherapy as a safe and effective treatment for the management of agitation in severe dementia: the results of a double-blind, placebo-controlled trial with Melissa. J Clin Psychiatry. 2002;63(7):553-8.
3. Burns A, Perry E, Holmes C, Francis P, Morris J, Howes MJ, et al. A double-blind placebo-controlled randomized trial of Melissa officinalis oil and donepezil for the treatment of agitation in Alzheimer's disease. Dement Geriatr Cogn Disord. 2011;31(2):158-64.
4. Cameron H, du Toit S, Richard G, Bearns L. Using lemon balm oil to reduce aggression and agitation in dementia: results of a pilot study. . Journal of Dementia Care. 2011;19(5):36–8.
5. Fu CY, Moyle W, Cooke M. A randomised controlled trial of the use of aromatherapy and hand massage to reduce disruptive behaviour in people with dementia. BMC Complement Altern Med. 2013;13:165.
6. Gray SG, Clair AA. Influence of aromatherapy on medication administration to residential-care residents with dementia and behavioral challenges. Am J Alzheimers Dis Other Demen. 2002;17(3):169-74.
7. Holmes C, Hopkins V, Hensford C, MacLaughlin V, Wilkinson D, Rosenvinge H. Lavender oil as a treatment for agitated behaviour in severe dementia: a placebo controlled study. International journal of geriatric psychiatry. 2002;17(4):305-8.
8. Lin PW, Chan WC, Ng BF, Lam LC. Efficacy of aromatherapy (Lavandula angustifolia) as an intervention for agitated behaviours in Chinese older persons with dementia: a cross-over randomized trial. International journal of geriatric psychiatry. 2007;22(5):405-10.
9. O'Connor DW, Eppingstall B, Taffe J, van der Ploeg ES. A randomized, controlled cross-over trial of dermally-applied lavender (Lavandula angustifolia) oil as a treatment of agitated behaviour in dementia. BMC Complement Altern Med. 2013;13:315.
10. Smallwood J, Brown R, Coulter F, Irvine E, Copland C. Aromatherapy and behaviour disturbances in dementia: a randomized controlled trial. International journal of geriatric psychiatry. 2001;16(10):1010-3.
11. Snow LA, Hovanec L, Brandt J. A controlled trial of aromatherapy for agitation in nursing home patients with dementia. J Altern Complement Med. 2004;10(3):431-7.
12. Holliday-Welsh DM, Gessert CE, Renier CM. Massage in the Management of Agitation in Nursing Home Residents with Cognitive Impairment. Geriatr Nurs. 2009;30(2):108-17.
13. Remington R. Calming music and hand massage with agitated elderly. Nursing research. 2002;51:317 - 23.
14. Ancoli-Israel S, Martin JL, Gehrman P, Shochat T, Corey-Bloom J, Marler M, et al. Effect of light on agitation in institutionalized patients with severe Alzheimer disease. Am J Geriatr Psychiatry. 2003;11(2):194-203.
15. Barrick AL, Sloane PD, Williams CS, Mitchell CM, Connell BR, Wood W, et al. Impact of ambient bright light on agitation in dementia. International journal of geriatric psychiatry. 2010;25(10):1013-21.
16. Burns A, Allen H, Tomenson B, Duignan D, Byrne J. Bright light therapy for agitation in dementia: a randomized controlled trial. International psychogeriatrics / IPA. 2009;21(4):711-21.

17. Dowling GA, Mastick J, Hubbard EM, Luxenberg JS, Burr RL. Effect of timed bright light treatment for rest-activity disruption in institutionalized patients with Alzheimer's disease. International journal of geriatric psychiatry. 2005;20(8):738-43.
18. Hickman SE, Barrick AL, Williams CS, Zimmerman S, Connell BR, Preisser JS, et al. The Effect of Ambient Bright Light Therapy on Depressive Symptoms in Persons with Dementia. Journal of the American Geriatrics Society. 2007;55(11):1817-24.
19. Riemersma-van der Lek RF, Swaab DF, Twisk J, Hol EM, Hoogendijk WJ, Van Someren EJ. Effect of bright light and melatonin on cognitive and noncognitive function in elderly residents of group care facilities: a randomized controlled trial. JAMA. 2008;299(22):2642-55.
20. Calkins M, Szmerekovsky JG, Biddle S. Effect of Increased Time Spent Outdoors on Individuals with Dementia Residing in Nursing Homes. Journal of Housing For the Elderly. 2007;21(3-4):211-28.
21. Cohen-Mansfield J, Werner P. Visits to an outdoor garden: Impact on behavior and mood of nursing home residents who pace. In: Vellas B, Fitten J, Frisoni G, editors. Research and Practice in Alzheimer's Disease Paris: Serdi; 1998. p. 419–36.
22. Connell BR, Sanford JA, Lewis D. Therapeutic Effects of an Outdoor Activity Program on Nursing Home Residents with Dementia. Journal of Housing For the Elderly. 2007;21(3-4):194-209.
23. Detweiler MB, Murphy PF, Kim KY, Myers LC, Ashai A. Scheduled Medications and Falls in Dementia Patients Utilizing a Wander Garden. American Journal of Alzheimer's Disease and Other Dementias. 2009;24(4):322-32.
24. Gigliotti CM, Jarrott SE. Effects of horticulture therapy on engagement and affect. Canadian Journal on Aging-Revue Canadienne Du Vieillissement. 2005;24(4):367-77.
25. Luk KY, Lai KYC, Li CC, Cheung WH, Lam SMR, Li HY, et al. The effect of horticultural activities on agitation in nursing home residents with dementia. International journal of geriatric psychiatry. 2011;26(4):435-6.
26. Vuolo P. Horticulture therapy in dementia care impact on behavioral symptoms, physical and cognitive activities. Goshen, NY: Elant At Goshen. 2003.
27. Choi AN, Lee MS, Cheong KJ, Lee JS. Effects of group music intervention on behavioral and psychological symptoms in patients with dementia: a pilot-controlled trial. Int J Neurosci. 2009;119(4):471-81.
28. Clark ME, Lipe AW, Bilbrey M. Use of music to decrease aggressive behaviors in people with dementia. J Gerontol Nurs. 1998;24(7):10-7.
29. Cooke M, Moyle W, Shum D, Harrison S, Murfield J. A Randomized Controlled Trial Exploring the Effect of Music on Quality of Life and Depression in Older People with Dementia. Journal of Health Psychology. 2010;15(5):765-76.
30. Goka F. The effects of combined music and reminiscence therapy for small groups of the elderly with senile dementia of Alzheimer Type, and the efficacy of the evaluation method. Japanese Journal of Music Therapy. 2005;5:25-38.
31. Groene RW. Effectiveness of Music Therapy 1:1 Intervention with Individuals Having Senile Dementia of the Alzheimer's Type. Journal of Music Therapy. 1993;30(3):138-57.
32. Guetin S, Portet F, Picot MC, Pommie C, Messaoudi M, Djabelkir L, et al. Effect of music therapy on anxiety and depression in patients with Alzheimer's type dementia: randomised, controlled study. Dement Geriatr Cogn Disord. 2009;28(1):36-46.

33. Ikeda M, Suzuki M, Sawai D, Noda S, Ota H, Yoshimizu C. Effects of nursing intervention using rhythmic exercise for patients with severe senile dementia. Nursing Research. 2006;39:301-13.
34. Irish M, Cunningham CJ, Walsh JB, Coakley D, Lawlor BA, Robertson IH, et al. Investigating the enhancing effect of music on autobiographical memory in mild Alzheimer's disease. Dement Geriatr Cogn Disord. 2006;22(1):108-20.
35. Ledger AJ, Baker FA. An investigation of long-term effects of group music therapy on agitation levels of people with Alzheimer's Disease. Aging & mental health. 2007;11(3):330-8.
36. Mihara B, Hosoya M, Mihara Y, Fujimoto M. The effect of music therapy for elderly with dementia: a comparative study between large group and small group sessions. Japanese Journal of Music Therapy. 2004;4:208-16.
37. Miura H, Kanayama Y, Mogi N, Endo H. Effect and significance of music therapy on elderly persons with mild dementia. 2005;5: 48–57.
38. Nair B, Heim C, Krishnan C, D'Este C, Marley J, Attia J. The effect of Baroque music on behavioural disturbances in patients with dementia. Australasian Journal on Ageing. 2011;30(1):11-5.
39. Hokkanen L, Rantala L, Remes AM, Harkonen B, Viramo P, Winblad I. Dance and movement therapeutic methods in management of dementia: a randomized, controlled study. Journal of the American Geriatrics Society. 2008;56(4):771-2.
40. Raglio A, Bellelli G, Traficante D, Gianotti M, Ubezio MC, Villani D, et al. Efficacy of music therapy in the treatment of behavioral and psychiatric symptoms of dementia. Alzheimer Dis Assoc Disord. 2008;22(2):158-62.
41. Raglio A, Oasi O, Gianotti M, Manzoni V, Bolis S, Ubezio MC, et al. Effects of music therapy on psychological symptoms and heart rate variability in patients with dementia. A pilot study. . Current Aging Science. 2010:242-6.
42. Raglio A, Bellelli G, Traficante D, Gianotti M, Ubezio MC, Gentile S, et al. Efficacy of music therapy treatment based on cycles of sessions: a randomised controlled trial. Aging & mental health. 2010;14(8):900-4.
43. Remington R. Calming music and hand massage with agitated elderly. Nursing Research

2002;51(5):317–23.
44. Sung HC, Chang SM, Lee WL, Lee MS. The effects of group music with movement intervention on agitated behaviours of institutionalized elders with dementia in Taiwan

Alzheimer's Research & Therapy. 2006;2(4):24.
45. Sung H-c, Chang AM, Abbey J. The effects of preferred music on agitation of older people with dementia in Taiwan. International journal of geriatric psychiatry. 2006;21(10):999-1000.
46. Sung H-C, Chang AM, Lee W-L. A preferred music listening intervention to reduce anxiety in older adults with dementia in nursing homes. Journal of Clinical Nursing. 2010;19(7-8):1056-64.
47. Suzuki M, Kanamori M, Watanabe M, Nagasawa S, Kojima E, Ooshiro H, et al. Behavioral and endocrinological evaluation of music therapy for elderly patients with dementia. Nurs Health Sci. 2004;6(1):11-8.

48. Suzuki M, Kanamori M, Nagasawa S, Tokiko I, Takayuki S. Music therapy-induced changes in behavioral evaluations, and saliva chromogranin A and immunoglobulin A concentrations in elderly patients with senile dementia. Geriatrics & Gerontology International. 2007;7(1):61-71.
49. Tuet RWK, Lam LCW. A preliminary study of the effects of music therapy on agitation in Chinese patients with dementia. Hong Kong Journal of Psychiatry. 2006;16: 87-91.
50. Van de Winckel A, Feys H, De Weerdt W, Dom R. Cognitive and behavioural effects of music-based exercises in patients with dementia. Clinical rehabilitation. 2004;18(3):253-60.
51. Baker R, Bell S, Baker E, Gibson S, Holloway J, Pearce R, et al. A randomized controlled trial of the effects of multi-sensory stimulation (MSS) for people with dementia. Br J Clin Psychol. 2001;40(Pt 1):81-96.
52. Baker R, Holloway J, Holtkamp CC, Larsson A, Hartman LC, Pearce R, et al. Effects of multi-sensory stimulation for people with dementia. J Adv Nurs. 2003;43(5):465-77.
53. van Weert JC, van Dulmen AM, Spreeuwenberg PM, Ribbe MW, Bensing JM. Behavioral and mood effects of snoezelen integrated into 24-hour dementia care. Journal of the American Geriatrics Society. 2005;53(1):24-33.
54. Hozumi S, Hori H, Okawa M, Hishikawa Y, Sato K. Favorable effect of transcranial electrostimulation on behavior disorders in elderly patients with dementia: a double-blind study. International Journal of Neuroscience. 1996;88(1-2):1-10.
55. Scherder EJ, Bouma A, Steen LM. Effects of "isolated" transcutaneous electrical nerve stimulation on memory and affective behavior in patients with probable Alzheimer's disease. Biol Psychiatry. 1998;43(6):417-24.
56. Scherder EJ, Bouma A. Effects of transcutaneous electrical nerve stimulation on memory and behavior in Alzheimer's disease may be stage-dependent. Biol Psychiatry. 1999;45(6):743-9.
57. Scherder EJ, Van Someren EJ, Swaab DF. Transcutaneous electrical nerve stimulation (TENS) improves the rest-activity rhythm in midstage Alzheimer's disease. Behav Brain Res. 1999;101(1):105-7.
58. Scherder E, Bouma A, van Someren E, Swaab D. Effects of transcutaneous electrical nerve stimulation (TENS) on mood and cognition in Alzheimer's disease. Alzheimer's Disease and Related Disorders Etiology, Pathogenesis and Therapeutics. 1999:763-9.
59. Scherder EJ, Van Someren EJ, Bouma A, v d Berg M. Effects of transcutaneous electrical nerve stimulation (TENS) on cognition and behaviour in aging. Behav Brain Res. 2000;111(1-2):223-5.
60. Scherder EJ, Deijen JB, Vreeswijk SH, Sergeant JA, Swaab DF. Cranial electrostimulation (CES) in patients with probable Alzheimer's disease. Behav Brain Res. 2002;128(2):215-7.
61. Scherder E, Knol D, van Someren E, Deijen JB, Binnekade R, Tilders F, et al. Effects of low-frequency cranial electrostimulation on the rest-activity rhythm and salivary cortisol in Alzheimer's disease. Neurorehabil Neural Repair. 2003;17(2):101-8.
62. Van Someren EJ, Scherder EJ, Swaab DF. Transcutaneous electrical nerve stimulation (TENS) improves circadian rhythm disturbances in Alzheimer disease. Alzheimer Dis Assoc Disord. 1998;12(2):114-8.
63. Baines S, Saxby P, Ehlert K. Reality orientation and reminiscence therapy. A controlled cross-over study of elderly confused people. The British journal of psychiatry : the journal of mental science. 1987;151:222-31.

64. Chapman SB, Weiner MF, Rackley A, Hynan LS, Zientz J. Effects of cognitive-communication stimulation for Alzheimer's disease patients treated with donepezil. Journal of speech, language, and hearing research : JSLHR. 2004;47(5):1149-63.
65. Ferrario E, Cappa G, Molaschi M, Rocco M, Fabris F. Reality orientation therapy in institutionalized elderly patients: Preliminary results. . Archives of Gerontology and Geriatrics. 1991;12 (Suppl 2):139-42.
66. Onder G, Zanetti O, Giacobini E, Frisoni GB, Bartorelli L, Carbone G, et al. Reality orientation therapy combined with cholinesterase inhibitors in Alzheimer's disease: randomised controlled trial. The British journal of psychiatry : the journal of mental science. 2005;187:450-5.
67. Niu YX, Tan JP, Guan JQ, Zhang ZQ, Wang LN. Cognitive stimulation therapy in the treatment of neuropsychiatric symptoms in Alzheimer's disease: a randomized controlled trial. Clinical rehabilitation. 2010;24(12):1102-11.
68. Spector A, Orrell M, Davies S, Woods B. Can reality orientation be rehabilitated? Development and piloting of an evidence-based programme of cognition-based therapies for people with dementia. Neuropsychological Rehabilitation. 2001;11(3-4):377-97.
69. Spector A, Thorgrimsen L, Woods B, Royan L, Davies S, Butterworth M, et al. Efficacy of an evidence-based cognitive stimulation therapy programme for people with dementia: randomised controlled trial. The British journal of psychiatry : the journal of mental science. 2003;183:248-54.
70. Tadaka E, Kanagawa K. A randomized controlled trial of a group care program for community-dwelling elderly people with dementia. Japan Journal of Nursing Science. 2004;1(1):19-25.
71. Wallis GG, Baldwin M, Higginbotham P. Reality orientation therapy — a controlled trial. British Journal of Medical Psychology. 1983;56(3):271-7.
72. Deponte A, Missan R. Effectiveness of validation therapy (VT) in group: preliminary results. Arch Gerontol Geriatr. 2007;44(2):113-7.
73. Haight BK, Gibson F, Michel Y. The Northern Ireland life review/life storybook project for people with dementia. Alzheimer's & dementia : the journal of the Alzheimer's Association. 2006;2(1):56-8.
74. Haslam C, Haslam SA, Jetten J, Bevins A, Ravenscroft S, Tonks J. The social treatment: the benefits of group interventions in residential care settings. Psychology and aging. 2010;25(1):157-67.
75. Lai CK, Chi I, Kayser-Jones J. A randomized controlled trial of a specific reminiscence approach to promote the well-being of nursing home residents with dementia. International psychogeriatrics / IPA. 2004;16(1):33-49.
76. Chatterton WB, F.;Morgan, K. The singer or the singing: who sings individually to persons with dementia and what are the effects? Am J Alzheimers Dis Other Demen. 2010;25(8):641-9.
77. Politis AM, Vozzella S, Mayer LS, Onyike CU, Baker AS, Lyketsos CG. A randomized, controlled, clinical trial of activity therapy for apathy in patients with dementia residing in long-term care. International journal of geriatric psychiatry. 2004;19(11):1087-94.
78. Wang JJ, Yen M, OuYang WC. Group reminiscence intervention in Taiwanese elders with dementia. Arch Gerontol Geriatr. 2009;49(2):227-32.
79. Peoples. Validation Therapy, Versus Reality Orientation as Treatment for Disorientated Institutionalised Elderly (Masters dissertation). 1982.

80. Robb SS, Stegman CE, Wolanin MO. No research versus research with compromised results: a study of validation therapy. Nurs Res. 1986;35(2):113-8.
81. Toseland RW, Diehl M, Freeman K, Manzanares T, Naleppa M, McCallion P. The Impact of Validation Group Therapy on Nursing Home Residents With Dementia. Journal of Applied Gerontology. 1997;16(1):31-50.
82. Camberg L, Woods P, Ooi WL, Hurley A, Volicer L, Ashley J, et al. Evaluation of Simulated Presence: a personalized approach to enhance well-being in persons with Alzheimer's disease. Journal of the American Geriatrics Society. 1999;47(4):446-52.
83. Cheston R, Thorne K, Whitby P, Peak J. Simulated presence therapy, attachment and separation amongst people with dementia. Dementia. 2007;6(3):442-9.
84. Cohen-Mansfield J, Werner P. Management of verbally disruptive behaviours in nursing home residents.

. Journals of Gerontology Series A: Biological Sciences and Medical Sciences. 1997;52:M369–M77.
85. Garland K, Beer E, Eppingstall B, O'Connor DW. A comparison of two treatments of agitated behavior in nursing home residents with dementia: simulated family presence and preferred music. Am J Geriatr Psychiatry. 2007;15(6):514-21.
86. Miller S, Vermeersch PE, Bohan K, Renbarger K, Kruep A, Sacre S. Audio presence intervention for decreasing agitation in people with dementia. Geriatr Nurs. 2001;22(2):66-70.
87. Peak JS, Cheston RI. Using simulated presence therapy with people with dementia. Aging & mental health. 2002;6(1):77-81.
88. Woods P, Ashley J. Simulated presence therapy: using selected memories to manage problem behaviors in Alzheimer's disease patients. Geriatr Nurs. 1995;16(1):9-14.
89. Burgio L, Stevens A, Guy D, Roth DL, Haley WE. Impact of two psychosocial interventions on white and African American family caregivers of individuals with dementia. Gerontologist. 2003;43(4):568-79.
90. Burns R, Nichols LO, Martindale-Adams J, Graney MJ, Lummus A. Primary care interventions for dementia caregivers: 2-year outcomes from the REACH study. Gerontologist. 2003;43(4):547-55.
91. Chenoweth L, King MT, Jeon Y-H, Brodaty H, Stein-Parbury J, Norman R, et al. Caring for Aged Dementia Care Resident Study (CADRES) of person-centred care, dementia-care mapping, and usual care in dementia: a cluster-randomised trial. The Lancet Neurology. 2009;8(4):317-25.
92. Farran CJ, Gilley DW, McCann JJ, Bienias JL, Lindeman DA, Evans DA. Psychosocial interventions to reduce depressive symptoms of dementia caregivers: A randomized clinical trial comparing two approaches. . Journal of Mental Health and Aging. 2004;10(4):337–50.
93. Fossey J, Ballard C, Juszczak E, James I, Alder N, Jacoby R, et al. Effect of enhanced psychosocial care on antipsychotic use in nursing home residents with severe dementia: cluster randomised trial. BMJ. 2006;332(7544):756-61.
94. Gitlin LN, Corcoran M, Winter L, Boyce A, Hauck WW. A randomized, controlled trial of a home environmental intervention: effect on efficacy and upset in caregivers and on daily function of persons with dementia. Gerontologist. 2001;41(1):4-14.
95. Gitlin LN, Winter L, Corcoran M, Dennis MP, Schinfeld S, Hauck WW. Effects of the home environmental skill-building program on the caregiver-care recipient dyad: 6-month outcomes from the Philadelphia REACH Initiative. Gerontologist. 2003;43(4):532-46.

96. Gonyea JG, O'Connor MK, Boyle PA. Project CARE: a randomized controlled trial of a behavioral intervention group for Alzheimer's disease caregivers. Gerontologist. 2006;46(6):827-32.
97. Gormley N, Lyons D, Howard R. Behavioural management of aggression in dementia: a randomized controlled trial. Age Ageing. 2001;30(2):141-5.
98. Graff MJ, Vernooij-Dassen MJ, Thijssen M, Dekker J, Hoefnagels WH, Olderikkert MG. Effects of community occupational therapy on quality of life, mood, and health status in dementia patients and their caregivers: a randomized controlled trial. J Gerontol A Biol Sci Med Sci. 2007;62(9):1002-9.
99. Huang HL, Shyu YI, Chen MC, Chen ST, Lin LC. A pilot study on a home-based caregiver training program for improving caregiver self-efficacy and decreasing the behavioral problems of elders with dementia in Taiwan. International journal of geriatric psychiatry. 2003;18(4):337-45.
100. Losada Baltar A, Izal Fernandez de Troconiz M, Montorio Cerrato I, Marquez Gonzalez M, Perez Rojo G. [Differential efficacy of two psychoeducational interventions for dementia family caregivers]. Revista de neurologia. 2004;38(8):701-8.
101. Marriott A, Donaldson C, Tarrier N, Burns A. Effectiveness of cognitive-behavioural family intervention in reducing the burden of care in carers of patients with Alzheimer's disease. The British journal of psychiatry : the journal of mental science. 2000;176:557-62.
102. Mador JE, Giles L, Whitehead C, Crotty M. A randomized controlled trial of a behavior advisory service for hospitalized older patients with confusion. International journal of geriatric psychiatry. 2004;19(9):858-63.
103. McCurry SM, Gibbons LE, Logsdon RG, Vitiello MV, Teri L. Nighttime insomnia treatment and education for Alzheimer's disease: a randomized, controlled trial. Journal of the American Geriatrics Society. 2005;53(5):793-802.
104. Moniz-Cook E, Elston C, Gardiner E, Agar S, Silver M, Win T, et al. Can training community mental health nurses to support family carers reduce behavioural problems in dementia? An exploratory pragmatic randomised controlled trial. International journal of geriatric psychiatry. 2008;23(2):185-91.
105. Nobili A, Riva E, Tettamanti M, Lucca U, Liscio M, Petrucci B, et al. The effect of a structured intervention on caregivers of patients with dementia and problem behaviors: a randomized controlled pilot study. Alzheimer Dis Assoc Disord. 2004;18(2):75-82.
106. Proctor R, Burns A, Powell HS, Tarrier N, Faragher B, Richardson G, et al. Behavioural management in nursing and residential homes: a randomised controlled trial. Lancet. 1999;354(9172):26-9.
107. Teri L, Logsdon RG, Uomoto J, McCurry SM. Behavioral Treatment of Depression in Dementia Patients: A Controlled Clinical Trial. The Journals of Gerontology Series B: Psychological Sciences and Social Sciences. 1997;52B(4):P159-P66.
108. Teri L, Gibbons LE, McCurry SM, Logsdon RG, Buchner DM, Barlow WE, et al. Exercise plus behavioral management in patients with Alzheimer disease: a randomized controlled trial. JAMA. 2003;290(15):2015-22.
109. Teri L, McCurry SM, Logsdon R, Gibbons LE. Training community consultants to help family members improve dementia care: a randomized controlled trial. Gerontologist. 2005;45(6):802-11.
110. Ulstein ID, Sandvik L, Wyller TB, Engedal K. A one-year randomized controlled psychosocial intervention study among family carers of dementia patients--effects on patients and carers. Dement Geriatr Cogn Disord. 2007;24(6):469-75.

111. Brodaty H, Draper BM, Millar J, Low LF, Lie D, Sharah S, et al. Randomized controlled trial of different models of care for nursing home residents with dementia complicated by depression or psychosis. J Clin Psychiatry. 2003;64(1):63-72.
112. Opie J, Doyle C, O'Connor DW. Challenging behaviours in nursing home residents with dementia: a randomized controlled trial of multidisciplinary interventions. International journal of geriatric psychiatry. 2002;17(1):6-13.
113. Rovner BW, Steele CD, Shmuely Y, Folstein MF. A randomized trial of dementia care in nursing homes. Journal of the American Geriatrics Society. 1996;44(1):7-13.
114. Burgener SC, Yang Y, Gilbert R, Marsh-Yant S. The effects of a multimodal intervention on outcomes of persons with early-stage dementia. Am J Alzheimers Dis Other Demen. 2008;23(4):382-94.
115. Rolland Y, Pillard F, Klapouszczak A, Reynish E, Thomas D, Andrieu S, et al. Exercise program for nursing home residents with Alzheimer's disease: a 1-year randomized, controlled trial. Journal of the American Geriatrics Society. 2007;55(2):158-65.
116. Steinberg M, Leoutsakos JM, Podewils LJ, Lyketsos CG. Evaluation of a home-based exercise program in the treatment of Alzheimer's disease: the Maximizing Independence in Dementia (MIND) study. International journal of geriatric psychiatry. 2009;24(7):680-5.