Systematic Review of Psychological Approaches to the Management of Neuropsychiatric Symptoms of Dementia

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Objective: The authors systematically reviewed the literature on psychological approaches to treating the neuropsychiatric symptoms of dementia.

Method: Reports of studies that examined effects of any therapy derived from a psychological approach that satisfied prespecified criteria were reviewed. Data were extracted, the quality of each study was rated, and an overall rating was given to each study by using the Oxford Centre for Evidence-Based Medicine criteria.

Results: A total of 1,632 studies were identified, and 162 satisfied the inclusion criteria for the review. Specific types of psychoeducation for caregivers about managing neuropsychiatric symptoms were effective treatments whose benefits lasted for months, but other caregiver interventions were not. Behavioral management techniques that are centered on individual patients' behavior or on caregiver behavior had similar benefits, as did cognitive stimulation. Music therapy and Snoezelen, and possibly sensory stimulation, were useful during the treatment session but had no longer-term effects; interventions that changed the visual environment looked promising, but more research is needed.

Conclusions: Only behavior management therapies, specific types of caregiver and residential care staff education, and possibly cognitive stimulation appear to have lasting effectiveness for the management of dementia-associated neuropsychiatric symptoms. Lack of evidence regarding other therapies is not evidence of lack of efficacy. Conclusions are limited because of the paucity of high-quality research (only nine level-1 studies were identified). More high-quality investigation is needed.

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The neuropsychiatric symptoms of dementia include signs and symptoms of disturbed perception, thought, mood, or behavior (1). Clinically significant neuropsychiatric symptoms are found in about one-third of dementia patients with mild impairment and in two-thirds with more severe impairment (2, 3) and in an even higher proportion of dementia patients in residential care (4, 5). Neuropsychiatric symptoms contribute significantly to caregiver burden, institutionalization (6), and decreased quality of life for patients with dementia (7).

Psychotropic medications are often prescribed for neuropsychiatric symptoms, but concerns have been raised about the safety and efficacy of these medications (8–10). Psychological approaches may have fewer risks, but little is known about their efficacy. We conducted a systematic review of psychological approaches to neuropsychiatric symptoms in dementia with the aim of making evidence-based recommendations about the use of these interventions. The review included studies examining any therapy derived from a psychological/psychosocial model. We considered the effects of the interventions in terms of neuropsychiatric symptoms and related outcomes and assessed whether the benefit was time limited or sustained.

Method

Search Strategy

We searched electronic databases through July 2003, reference lists from individual and review articles, and the Cochrane Library and sought expert knowledge of additional studies, even those published after July 2003. We also hand-searched the contents of three journals published during the 10-year period up to July 2003.

We used search terms encompassing individual dementias and interventions. We included studies with quantitative outcome measures that were either direct or proxy measures of neuropsychiatric symptoms (e.g., care costs, quality of life, institutionalization, and decreased medication or restraint). Studies of people without dementia, dementia secondary to head injury, or interventions that either involved medication or were not based on a psychological model (e.g., aromatherapy, homeopathy, occupational therapy, light therapy) were excluded.

Data Extraction Strategy

We used a tool adapted from a review of checklists (11). Ratings of the level of evidence were assigned to studies according to the Oxford Centre for Evidence-Based Medicine guidelines (http://www.cebm.net/levels_of_evidence.asp#levels). Levels of evidence grades ranged from 1 to 5, with lower numbers indicating higher quality. Each type of intervention was then given an overall "grade of recommendation" according to the Oxford Centre for Evidence-Based Medicine criteria. The grades ranged

TABLE 1. Studies of the Use of Reminiscence Therapy and Validation Therapy in the Management of Neuropsychiatric Symptoms of Dementia

Study	Randomization	Comparison Group	Number of Patients	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Brooker and Duce, 2000 (12)	No	Yes	25	Patients were their own comparison subjects.	Reminiscence therapy, group activities, or unstructured time	Reminiscence therapy group had improved well-being (time of follow-up not reported).	4
Baines et al., 1987 (13)	Yes	Yes	10 (five received reality orientation therapy then reminiscence therapy, five received reminiscence therapy then reality orientation therapy)	5	Reality orientation therapy or reminiscence therapy	Improved behavior at 6-month follow-up in group that received reality orientation therapy then reminiscence therapy, compared to other group (significance not reported)	2b
Goldwasser et al., 1987 (14)	Yes	Yes	9 (reminiscence therapy), 9 (support)	9	Reminiscence therapy group or supportive group therapy	Reminiscence therapy improved depressed mood but had no effect on behavior at 5 weeks.	2b
Korb, 1997 (15)	Yes	Yes	10	10 (patients were their own comparison subjects)	Eight sessions of reminiscence therapy or music therapy	Reminiscence therapy had no effect on mood.	2b
Haight et al., 2003 (16)	No	Yes	11	11	Reminiscence by life review	Significant improvement in carer-rated mood in intervention group at 2 months	4
Babins, 1988 (17)	No	Yes	5	Not specified	22 validation therapy sessions	Improvement in irritability scores	4
Morton and Bleathman, 1991 (18)	No	Yes	5 single cases	Patients were their own comparison subjects.	20 weeks of validation therapy groups then 10 weeks of group work	No change on behavior rating scales	5
Toseland et al., 1997 (19)	Yes	Yes	31	57 (28 received social contact, 29 received usual care)	Validation therapy group sessions	No change in depression, psychotropic use, or restraint use in validation therapy group	2b

[a] Levels of evidence were rated according to Oxford Centre for Evidence-Based Medicine guidelines and ranged from 1 to 5, with lower numbers indicating higher quality. Lowercase letters ("a," "b," "c"), used to designate level 1, 2, and 3 studies, indicate finer-quality gradations, with a range from "a" (higher quality) to "c" (lower quality).

from A (consistent level of evidence grade of 1) to D (level of evidence grade of 5 or troublingly inconsistent or inconclusive studies at any level).

Results

We identified 1,632 references; 1,421 were excluded and 162 were included.

Reminiscence Therapy

Reminiscence therapy (Table 1) uses materials such as old newspapers and household items to stimulate memories and enable people to share and value their experiences. We identified five studies of reminiscence therapy interventions (12–16). Three were small randomized, controlled trials. One had 10 participants and reported behavioral improvements when reminiscence therapy was preceded by reality orientation, but not vice versa (13). The improvement was not clearly significant. The other two studies found no benefit of reminiscence therapy (14, 15). Two level-4 studies had small numbers (12, 16). One reported a significant improvement in mood, although the raters were not masked to participants' treatment group (16).

- We assigned a grade of recommendation of D to reminiscence therapy.

Validation Therapy

Validation therapy (Table 1), rooted within the Rogerian humanistic psychology premise of individual uniqueness, is intended to give an opportunity to resolve unfinished conflicts by encouraging and validating expression of feel-

TABLE 2. Studies of the Use of Reality Orientation Therapy in the Management of Neuropsychiatric Symptoms of Dementia

Author	Randomization	Comparison Group	Number of Patients	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Baines et al., 1987 (13)	Yes	Yes	10 (five received reality orientation therapy then reminiscence therapy, five received reminiscence therapy then reality orientation therapy)	5	Reality orientation therapy or reminiscence therapy	Improved behavior at 6-month follow-up in group that received reality orientation therapy then reminiscence therapy, compared to other group (significance not reported)	2b
Baldelli et al., 1993 (20)	No	Yes	23 (including comparison subjects)	23 (including intervention subjects)	Reality orientation therapy group	Decreased depression in reality orientation therapy group	4
Brook et al., 1975 (21)	No	Yes	9	9	Reality orientation therapy group sessions	Experimental groups showed improvement in scores on a nonstandard social functioning scale.	3b
Greene et al., 1979 (22)	No	No	3 single cases	0	Reality orientation therapy sessions	Some improvement in behavior (type not specified)	5
Greene et al., 1983 (23)	No	Yes	20	Patients were their own comparison subjects.	Reality orientation therapy (two 30-minute sessions 2–3 days a week)	Significant improvement in mood of patients at the end of the orientation phase	4
Hanley et al., 1981 (24)	Yes	Yes	28	29	Classroom reality orientation therapy; ward orientation training	No behavioral change in either group	2b
Ishizaki et al., 2000 (25)	No	No	6	0	Reality orientation therapy group sessions (3 hours/week for 3 months)	No change in behavior	4
Johnson et al., 1981 (26)	No	Yes	75	23	Standard classroom reality orientation therapy presented once daily in groups, twice daily in groups, or once daily individually	All groups showed the improvement in nonstandardized scores, relative to untreated comparison group	4
Metitieri et al., 2001 (27)	No	Yes	46	28	Reality orientation therapy sessions (8–40 weeks)	Reality orientation therapy patients remained at home significantly longer than comparison patients	4
Reeve and Ivison, 1985 (28)	No	Yes	10	8	Classroom reality orientation therapy, modified informal reality orientation therapy, environmental manipulation	Combined environmental manipulation and informal reality orientation therapy improved behavioral symptoms; effects of combined therapy lasted up to 3 months.	4
Panella et al., 1984 (29)	No	No	69	0	Reality orientation therapy, validation therapy, family support, recreation therapy	Reduced institutionalization	4

[a] Levels of evidence were rated according to Oxford Centre for Evidence-Based Medicine guidelines and ranged from 1 to 5, with lower numbers indicating higher quality. Lowercase letters ("a," "b," "c"), used to designate level 1, 2, and 3 studies, indicate finer-quality gradations, with a range from "a" (higher quality) to "c" (lower quality).

ings. We identified three studies of validation therapy. The first, a case series of five individuals, indicated an improvement in irritability after validation therapy (17). The second, which included five patients who served as their own comparison subjects, reported no change in behavior (18). A randomized, controlled trial compared validation ther-

TABLE 3. Studies of the Use of Cognitive Stimulation and Other Dementia-Specific Therapies in the Management of Neuropsychiatric Symptoms of Dementia

Author	Randomization	Comparison Group	Number of Patients	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Mitchell and Maercklein, 1996 (30)	Yes	Yes	15	15	Five half-hour sessions with individualized special instruction	No significant deterioration in intervention group	4
Quayhagen et al., 1995 (31)	Yes	Yes	25	28 subjects who received placebo (passive activity); 25 wait-list comparison subjects	12 weekly in-home cognitive stimulation therapy sessions	Experimental and activity group had fewer behavioral problems at all time points, relative to comparison subjects, but returned to baseline functioning by 9-month follow-up.	2b
Quayhagen et al., 2000 (32)	Yes	Yes	88 (21) in cognitive stimulation group, 29 in counseling group, 22 in seminar group, 16 in day-care group)	15	8-week reality orientation therapy program	? No significant differences in behavioral symptoms across interventions	4
Romero and Wenz, 2001 (33)	No	Yes	43 (number of patients in each group was not specified)	43 (number of patients in each group was not specified)	3-week inpatient program of self-maintenance therapy	Significant decrease in depression and behavioral symptoms	4
Spector et al., 2001 (34)	Yes	Yes	17	10	15 sessions cognitive stimulation	Significant decrease in depression	2b
Spector et al., 2003 (35)	Yes	Yes	115	86	14 cognitive stimulation sessions	Improvement in quality of life (more improvement in women than in men)	1b

[a] Levels of evidence were rated according to Oxford Centre for Evidence-Based Medicine guidelines and ranged from 1 to 5, with lower numbers indicating higher quality. Lowercase letters ("a," "b," "c"), used to designate level 1, 2, and 3 studies, indicate finer-quality gradations, with a range from "a" (higher quality) to "c" (lower quality).

apy to usual care or a social contact group in 88 patients with dementia (19). Although at 1-year follow-up the nursing staff thought the validation therapy group improved, there was no difference in independent outcome ratings, in nursing time needed, or in use of psychotropic medication and restraint.

- Because of the absence of conclusive evidence, we assigned a grade of recommendation of D to validation therapy.

Reality Orientation Therapy

Reality orientation therapy (Table 2) is based on the idea that impairment in orientating information (day, date, weather, time, and use of names) prevents patients with dementia from functioning well and that reminders can improve functioning. Eleven studies assessed reality orientation therapy (13, 20–29). The strongest randomized, controlled trial, which had 57 participants, showed no immediate benefit of reality orientation therapy, compared to active ward orientation (24). In a smaller randomized, controlled trial (N=10), patients who received reality orientation therapy followed by reminiscence therapy had fewer neuropsychiatric symptoms, compared to patients who received the treatments in the reverse order (13). The other smaller nonrandomized, controlled trials mostly found benefits in the reality orientation therapy groups in terms of improved mood, decreased neuropsychiatric symptoms, or delayed institutionalization.

- The grade of recommendation for reality orientation therapy is D.

Cognitive Stimulation Therapy

Cognitive stimulation therapy (Table 3), derived from reality orientation therapy, uses information processing rather than factual knowledge to address problems in functioning in patients with dementia. Three of four randomized, controlled trials of cognitive stimulation therapy (31, 32, 34, 35) showed some positive results, although the studies used different follow-up endpoints (immediately after therapy to 9 months after therapy). There were early behavior improvements, relative to waiting list. By 9 months, no significant difference between groups was

TABLE 4. Studies of the Use of Non-Dementia-Specific Psychological Therapies in the Management of Neuropsychiatric Symptoms of Dementia

Evidence Level and Study	Randomization	Comparison Group	Number of Patients	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Levels 1–4							
Beck et al., 2002 (36)	Yes	Yes	89	54 (30 received placebo, 24 received no intervention)	Behavioral management techniques, including behavioral intervention during activities of daily living or activity or both	No reduction in disruptive behavior.	2b
Benedict et al., 2000 (37)	Yes	Yes	8	7	Behavioral management techniques/supportive psychotherapy, including education, social skills training, identification of abnormal behavior	Behavioral management techniques reduced social aggression and disinhibition. No effect on depression was found.	2b
DeYoung et al., 2002 (38)	No	Yes	32	Patients were their own comparison subjects.	Behavior management unit with behavior management program	Reduced aggressive, agitated, or disruptive behaviors at 6 months	4
Hoeffer et al., 1997 (39)	No	Yes	10	Patients were their own comparison subjects.	Behavioral management techniques, including functional analysis of bathing and person-centered bathing (individualized bathing routines based on the patient's preferences)	Reduced aggression	4
Mishara, 1978 (40)	No	Yes	40	Patients were their own comparison subjects.	Behavioral management techniques (token economy) (behavior before intervention compared with behavior after intervention)	Intervention reduced bizarre behaviors after 6 months, compared to preintervention period, but was less effective than general milieu treatment.	2b
Rogers et al., 1999 (41)	No	Yes	84	Patients were their own comparison subjects.	Behavioral management techniques, including usual care, skill elicitation, habit training for activities of daily living tasks (dressing)	Significant reduction in agitation scores with behavioral management, compared to usual care alone	4
Suhr et al., 1999 (42)	Yes	Yes	17	17	Behavioral management techniques, including progressive muscle relaxation	Significant reduction in behavioral symptoms with behavioral management, compared to usual care	2b
Teri et al., 1997, 1994 (43, 44)	Yes	Yes	42	30	Behavioral management techniques, including behavior therapy emphasizing pleasant events (manual-guided intervention for patient and carer) or behavior therapy emphasizing problem solving (carer only)	Significant reduction in depression for both groups immediately after intervention and at 6-month follow-up	1b
Welden and Yesavage, 1982 (45)	No	Yes	24	24	Behavioral management techniques, including progressive muscle relaxation and imaging	Significant reduction in behavioral symptoms	4

(continued)

TABLE 4. Studies of the Use of Non-Dementia-Specific Psychological Therapies in the Management of Neuropsychiatric Symptoms of Dementia *(continued)*

Evidence Level and Study	Randomization	Comparison Group	Number of Patients	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Level 5							
Alexopoulos, 1994 (46)	No	No	1	Patient was own comparison subject.	Behavioral management techniques, including written cue with spaced retrieval	Sexually disinhibited behavior disappeared	5
Bakke et al., 1994 (47)	No	Yes	1	Patient was own comparison subject.	Cognitive behavior therapy, including functional analysis of behavior then behavioral reinforcement	Reduced agitation during intervention period	5
Birchmore and Clague, 1983 (48)	No	Yes	1	Patient was own comparison subject.	Behavioral program to reduce shouting	Reduced time spent vocalizing during treatment	5
Bird et al., 1995 (49)	No	Yes	5 single cases	Patients were their own comparison subjects.	Individualized behavioral management programs using fading cues and spaced retrieval	Four of five patients showed "adaptive behavior change." Effects were not long-lasting.	5
Boehm et al., 1995 (50)	No	Yes	2 single cases	Patients were their own comparison subjects.	Behavioral reinforcement	Reduced aggressive behaviors	5
Buchanan and Fisher, 2002 (51)	No	Yes	2 single cases	Patients were their own comparison subjects.	Behavioral management techniques, including functional assessment of disruptive vocalizations followed by noncontingent reinforcement	Significant reduction in disruptive vocalizations	5
Carpenter et al., 2003 (52)	No	Yes	3	Patients were their own comparison subjects.	Behavioral management techniques, including 16 sessions of restore-empower-mobilize psychotherapy	Depression reduced immediately after intervention but increased at follow-up	5
Doyle et al., 1997 (53)	No	Yes	7 single cases	Patients were their own comparison subjects.	Behavioral management techniques, including reinforcement of quiet behavior and stimulation	Three of seven patients improved.	5
Heard and Watson, 1999 (54)	No	Yes	4 single cases	Patients were their own comparison subjects.	Individual behavioral intervention programs	Individualized interventions reduced wandering	5
Jozsvai et al., 1996 (55)	No	Yes	1	Patient was own comparison subject.	Behavioral management techniques, including a token economy	Intervention reduced but did not extinguish target behaviors	5
Kipling et al., 1999 (56)	No	Yes	3	Patients were their own comparison subjects.	Group cognitive behavior therapy	Reduced anxiety in all three patients, improved mood in two patients	5
Koder, 1998 (57)	No	No	2 single cases	Patients were their own comparison subjects.	Anxiety management using cognitive behavior therapy techniques	Mild behavioral change in both patients	5
Lundervold and Jackson, 1992 (58)	No	No	1	Patient was own comparison subject.	Behavioral management techniques, including applied behavior analysis (conducted by staff)	Patient had lower number of aggressive episodes per month and was free of restraint 99% of time.	5
Moniz-Cook et al., 2001 (59)	No	No	5 single cases	Patients were their own comparison subjects.	Behavioral management techniques, including individualized functional analysis based on patient's superstitions	Reduced agitation, aggression, refusal in all cases	5
Wisner and Green, 1986 (60)	No	Yes	1	Patient was own comparison subject.	Cognitive behavior therapy (time-out, anger management, self-monitoring by patient)	Reduced "outbursts" during intervention	5

[a] Levels of evidence were rated according to Oxford Centre for Evidence-Based Medicine guidelines and ranged from 1 to 5, with lower numbers indicating higher quality. Lowercase letters ("a," "b," "c"), used to designate level 1, 2, and 3 studies, indicate finer-quality gradations, with a range from "a" (higher quality) to "c" (lower quality).

TABLE 5. Studies of the Use of Caregiver Interventions Involving Training in Behavioral Management Therapy for Management of Neuropsychiatric Symptoms of Dementia

Study	Randomization	Comparison Group	Number of Patients or Caregivers	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Bourgeois et al., 1997 (61)	Yes	Yes	7	7	Caregiver training in behavioral management techniques	Intervention group had reduced repetitive verbalizations, compared to baseline.	4
Gormley et al., 2001 (62)	Yes	Yes	43	28	Caregiver training in behavioral management techniques	No postintervention difference in aggression was found between groups; reduced aggression within behavior management group approached significance.	2b
Huang et al., 2003 (63)	Yes	Yes	24	24	Caregiver training in behavioral management techniques	Intervention group had lower agitation scores	2b
Teri and Uomoto, 1991 (64)	No	No	4	0	Behavioral management techniques and caregiver's increasing of pleasant activities	Two patients improved in depression scores. Increased pleasant events was associated with decreased depression.	5
Teri et al., 2000 (65)	Yes	Yes	41	36 (placebo group), 71 (medication group)	Caregivers were trained in behavioral management techniques. Comparison subjects in the medication group received haloperidol or trazodone.	No difference in global outcome or agitation between groups.	1b
Teri et al., 2003 (66)	Yes	Yes	76	77	Caregiver training in behavioral management techniques plus exercise for the patient	Participants had reduced depression, relative to comparison subjects; no difference in depression at 2 years.	1b
Weiner et al., 2002 (67)	Yes	Yes	17	21	Caregiver training in behavioral management techniques	No difference between groups in use of psychotropic drugs or symptom frequency after 12 months.	2b

[a] Levels of evidence were rated according to Oxford Centre for Evidence-Based Medicine guidelines and ranged from 1 to 5, with lower numbers indicating higher quality. Lowercase letters ("a," "b," "c") used to designate level 1, 2, and 3 studies, indicate finer-quality gradations, with a range from "a" (higher quality) to "c" (lower quality).

found. One study showed reduced depression, and another showed improvement in quality of life but not in mood (34, 35). The final study did not report whether the differences in behavior were significant (32).

- Given the mostly consistent evidence that cognitive stimulation therapy improves aspects of neuropsychiatric symptoms immediately and for some months afterward, our consensus is that the grade of recommendation is B, although the evidence is not consistent in all respects.

Other Dementia-Specific Therapies

We identified two other dementia-specific therapies (30, 33) (Table 3). The first, "individualized special instruction," consisted of 30 minutes of focused individual attention and participation in an activity appropriate for each individual (30). The participants in the pilot randomized, controlled trial were their own waiting-list comparison subjects. During the intervention period, their behavior did not deteriorate, compared with deteriorating behavior before the intervention period.

The second dementia-specific therapy was "self-maintenance therapy," which is intended to help the patient maintain a sense of personal identity, continuity, and coherence (33). This intervention incorporates techniques from validation, reminiscence, and psychotherapy. A 3-week admission of patients and caregivers to a specialist unit in which self-maintenance therapy was provided led to a significant decrease in depression and problematic behavior, compared to baseline. This outcome may have been partly attributable to the environment.

- These level-4 studies support a grade of recommendation of C for both interventions.

Non-Dementia-Specific Therapies

Twenty-five reports described use of non-dementia-specific psychological therapies for patients with dementia (36–60) (Table 4). Nearly all of the studies examined behavioral management techniques. In one large random-

TABLE 6. Studies of the Use of Other Caregiver Interventions in the Management of Neuropsychiatric Symptoms of Dementia

Author	Randomization	Comparison Group	Number of Patients or Caregivers	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Burgener et al., 1998 (68)	Yes	Yes	35	12	Caregiver education about dementia and how to change interaction with patient	No difference between groups in disruptive behavior at 6 months	2b
Marriot et al., 2000 (69)	Yes	Yes	14	28	Caregiver training in behavioral management techniques	Significant improvement in behavior in intervention group, relative to the comparison group, immediately after intervention but not at 3 months	2b
Eloniemi-Sulkava et al., 2001 (70)	Yes	Yes	43	43	Support for patients and caregivers (counseling, advocacy, training)	Reduced institutionalization during first 3 months, with decreasing benefit over time	1b
Ghatak, 1994 (71)	No	Yes	20	20	Caregiver training in awareness and problem solving	Significant difference between groups in patient behavior was reported (no figures reported).	4
Haupt et al., 2000 (72)	No	Yes	14	Patients were their own comparison subjects	Manual-guided group intervention with caregivers that included cognitive behavior therapy, modeling, knowledge dissemination, financial and social advice	Significant reduction in patient anxiety and agitation from pre- to postintervention; no change in other neuropsychiatric symptoms	4
Hebert et al., 2003 (73)	Yes	Yes	79	79	Psychoeducational group program	Frequency of behavior problems was reduced (difference approached significance).	2b
McCallion et al., 1999 (74)	Yes	Yes	32	34	Education program, caregiver groups, family conferences, family visit with feedback about interaction	Reduction in depression, ideational disturbance, and agitation during family visits, reduced pacing, significant reduction in use of restraint at 6-month follow-up	2b
Droes et al., 2000 (75)	No	Yes	33	23	Integrated family support program	Reduced behavioral problems in family support group after 7 months; no effects on mood	4
Ferris et al., 1987 (76)	No	No	41	0	Family counseling sessions	Reduced behavioral problems in patients	4
Wells et al., 2000 (77)	Yes	Yes	12	20	Caregiver education in abilities-focused morning care of patient	Reduced agitation in intervention group at 6 months	2b
Mittelman et al., 1996 (78)	Yes	Yes	103	103	Six sessions of psychoeducation and problem solving plus support groups	Time to nursing home placement was 329 days longer in treatment group than in comparison group.	1b
Woods et al., 2003 (79)	No	Yes	55	73	Specialist "admiral" nurse service	No differences between groups	2c

[a] Levels of evidence were rated according to Oxford Centre for Evidence-Based Medicine guidelines and ranged from 1 to 5, with lower numbers indicating higher quality. Lowercase letters ("a," "b," "c"), used to designate level 1, 2, and 3 studies, indicate finer-quality gradations, with a range from "a" (higher quality) to "c" (lower quality).

ized, controlled trial, participants received either manual-guided treatment for the patient and caregiver or a problem-solving treatment for the caregiver only (43). The two interventions were equally successful in improving depressive symptoms immediately and at 6-month follow-up (43, 44). Two other small randomized, controlled trials also had positive results (37, 42). In one of those studies,

TABLE 7. Studies of the Use of Music Therapy in the Management of Neuropsychiatric Symptoms of Dementia

Author	Randomization	Comparison Group	Number of Patients	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Ashida, 2000 (80)	No	Yes	20	Patients were their own comparison subjects.	Group music therapy sessions	Reduced depressive symptoms during and after therapy, no lasting effect	4
Brotons and PickettCooper, 1996 (81)	No	Yes	20	Patients were their own comparison subjects.	Five music therapy sessions	Reduced agitation during and after music therapy sessions	5
Casby and Holm, 1994 (82)	No	Yes	3	Patients were their own comparison subjects.	Classical or favorite music	Reduced disruptive vocalization in two patients	4
Clair and Bernstein, 1994 (83)	No	Yes	28	Patients were their own comparison subjects.	Comparison of no music, stimulating music, and sedative music	No significant reduction in agitation	4
Clark et al., 1998 (84)	Yes	Yes	19	Patients were their own comparison subjects.	Preferred music during bath time	Reduced aggression during music	4
Denney, 1997 (85)	No	Yes	9	Patients were their own comparison subjects.	Quiet music at mealtimes	Reduced agitation during therapy	4
Fitzgerald-Cloutier, 1993 (86)	No	Yes	1	Patient was own comparison subject.	Either music therapy or reading sessions	Increased sitting time during music, compared with during reading (no statistics provided)	5
Gardiner et al., 2000 (87)	No	Yes	2	Patients were their own comparison subjects.	Music therapy or reading sessions	Reduced disruptive behavior during music sessions	5
Gaebler and Hemsley, 1991 (88)	No	Yes	6	Patients were their own comparison subjects.	Reminiscence music therapy	Positive outcome for two of six patients	5
Gerdner, 2000 (89)	No	Yes	5	Patients were their own comparison subjects.	Individual music therapy program	Reduced agitation during therapy and in the hour after therapy	5
Gerdner and Swanson, 1993 (90)	Yes	Yes	39	39	Classical/ individualized music therapy for 6 weeks	More reduction in agitation with individualized therapy (30 versus 10 minutes)	2b
Goddaer and Abraham, 1994 (91)	No	Yes	29	Patients were their own comparison subjects.	Relaxing music followed by no intervention or vice versa	Reduction in agitated behaviors with music, increase in agitated behaviors when music was removed	4
Groene, 1993 (92)	Yes	Yes	30	30	Two reading sessions plus five music sessions or vice versa	Increased time sitting still during mostly music versus mostly reading sessions	2b
Jennings and Vance, 2002 (93)	No	Yes	17	Patients were their own comparison subjects.	Weekly 30-minute group music session	Reduced agitation after session	4
Korb, 1997 (15)	Yes	Yes	10	Patients were their own comparison subjects.	30 minutes of music therapy (rhythm or singing) twice a week for 12 weeks or reminiscence therapy	Improved mood immediately after all music sessions, compared to reminiscence sessions	2b
Lindenmuth et al., 1992 (94)	No	Yes	10	10	Relaxing music played as participants went to sleep	Improved sleep	4
Lord and Garner, 1993 (95)	Yes	Yes	20	20 (puzzle); 20 (standard treatment)	Big Band music, puzzle-play sessions, standard treatment	Mood and social interaction better in music groups	2b

(continued)

TABLE 7. Studies of the Use of Music Therapy in the Management of Neuropsychiatric Symptoms of Dementia *(continued)*

Author	Randomization	Comparison Group	Number of Patients	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Millard and Smith, 1989 (96)	No	Yes	10	Patients were their own comparison subjects.	10 singing sessions (30 minutes) twice a week for 5 weeks versus discussion	Increased talking in singing group during/immediately after group	4
Ragneskog et al., 1996 (97)	No	Yes	20	Patients were their own comparison subjects.	Music during mealtimes	Reduced irritability and depression	4
Remington, 2002 (98)	Yes	Yes	51	17	10 minutes of calming music or hand massage, both interventions one after another, both interventions simultaneously	Reduced agitation for 1 hour in all intervention groups, relative to comparison group	2b
Runci et al., 1999 (99)	No	Yes	1	Patient was own comparison subject.	Language-relevant intervention (music therapy and interaction in Italian)	Reduced disruptive vocalizations and increased talking during interaction in Italian	5
Sambandham and Schirm, 1995 (100)	No	No	19	0	Group music sessions (1 hour twice a week for 3 weeks)	Increase in quieter interaction, more interaction	5
Tabloski et al., 1995 (101)	No	Yes	20	Patients were their own comparison subjects.	15 minutes of calming music following period of agitation	Significant reduction in agitated behavior during and after music sessions	4
Thomas et al., 1997 (102)	No	Yes	14	Patients were their own comparison subjects.	Individualized music played before and during bathing	No decrease in aggression	4

[a] Levels of evidence were rated according to Oxford Centre for Evidence-Based Medicine guidelines and ranged from 1 to 5, with lower numbers indicating higher quality. Lowercase letters ("a," "b," "c"), used to designate level 1, 2, and 3 studies, indicate finer-quality gradations, with a range from "a" (higher quality) to "c" (lower quality).

participants had significantly fewer neuropsychiatric symptoms 2 months after being taught progressive muscle relaxation. In the other study, the behavior of patients with the dementia of multiple sclerosis improved with "neuropsychological counseling" (a cognitive behavior intervention). There were two other randomized, controlled trials in which behavioral management techniques were used (36, 40); these techniques were ineffective in one of the studies (36). It used a complex, difficult-to-classify intervention that included a variety of techniques (e.g., life review, sensory stimulation, single-word commands, and problem-oriented strategies) (36). The second used a token economy, which was more effective in reducing "bizarre" behavior in patients with severe dementia, compared to a preintervention condition, but less effective than a milieu treatment (40). Several single-case studies are summarized in Table 4.

- The grade of recommendation for standard behavioral management techniques in dementia is B. The findings of the larger randomized, controlled trials were consistent and positive, and the effects lasted for months.

Psychological Interventions With Caregivers

Table 5 and Table 6 summarize 19 reports that describe interventions with family caregivers designed to ameliorate neuropsychiatric symptoms or frequency of institutionalization in dementia (61–79). Seven studies involved training the caregiver to use behavioral management techniques (Table 5). A randomized, controlled trial (65) found no difference in agitation or global outcome in a comparison of treatment with behavioral management techniques, haloperidol or trazodone alone, or placebo at 16 weeks. Behavioral management techniques taught to caregivers did not reduce psychotropic drug use or symptom frequency at 1-year follow-up (67). Exercise and behavioral management techniques led to significant improvements in depression at 3 months but not at 2 years (66). In a smaller randomized, controlled trial, behavioral management techniques based on the progressive Lowered Stress Threshold Model were taught to caregivers with the aim of reducing stimulation in response to specific stressors identified by caregivers (63). Both study groups received the intervention, one in the form of written materials, and the other in a training program. A positive effect for care recipients was found in the second group. The evidence that behavioral management techniques with caregivers and exercise training with patients helps depression is strong, but it is unclear which component was the active component.

- Because the findings of other studies are inconsistent, the grade of recommendation for teaching caregivers

TABLE 8. Studies of the Use of Sensory Stimulation in the Management of Neuropsychiatric Symptoms of Dementia

Author	Randomization	Comparison Group	Number of Patients	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Baker et al., 1997 (105)	Yes	Yes	31in total (one-half of the group were comparison subjects)	31 (one-half of the group were comparison subjects)	Eight one-to-one sessions of Snoezelen or general activity conducted twice weekly	Reduction in socially disturbed behavior in Snoezelen group at home during period of treatment	2b
Baker et al., 2001 (104)	Yes	Yes	50 in trial, but not clear how many in each group	50 in trial, but not clear how many in each group	Snoezelen or general activity sessions	Improvement in mood and behavior in the Snoezelen group did not last to 1-month follow-up.	1b
Burgio et al., 1996 (109)	No	Yes	13	Patients were their own comparison subjects.	Exposure to white noise audiotapes during agitation	Significant reduction in agitation during white noise tapes	4
Hope, 1998 (108)	No	No	29	0	Exposure to multisensory environment	Positive mood when in multisensory environment (no statistics reported)	4
Kempenaar et al., 2001 (110)	Yes	Yes	16	19	Twenty twice weekly therapist-facilitated sensory stimulation sessions, including sounds, smells, taste, touch, sights	No changes	4
Kim and Buschmann, 1999 (111)	No	Yes	29	Patients were their own comparison subjects.	Expressive touch for 5.5 minutes/day for 10 days	Improvement in behavior during intervention and for 5 days afterward	4
Remington, 2002 (98)	Yes	Yes	51	17	Calming music, hand massage, music followed by massage, or music and massage simultaneously for 10 minutes each	All experimental groups had reduced agitation, relative to the comparison group. Effect lasted for 1 hour.	2b
Robichaud et al., 1994 (112)	Yes	Yes	84	18	Three 45-minute sessions of sensory integration for 10 weeks	No significant reduction in disruptive behaviors immediately	2b
Snyder et al., 1995 (113)	No	Yes	19	Patients were their own comparison subjects.	Hand massage, therapeutic touch, or a comparison condition in a crossover design	No change in agitated behaviors	4
Spaull and Leach, 1998 (106)	No	Yes	4	Patients were their own comparison subjects.	Snoezelen	Reduction in challenging behaviors after sessions; no difference in well-being scores	5
Van Diepen et al., 2002 (103)	Yes	Yes	5	5	Eight one-to-one twice weekly Snoezelen sessions	Agitation scores tended to be lower in the Snoezelen group.	2b
Young et al., 1988 (114)	Yes	Yes	8	Patients were their own comparison subjects.	White noise played at night	No immediate effect on sleep	2b
Wareing et al., 1998 (107)	No	Yes	4	Patients were their own comparison subjects.	Three weeks of thrice weekly Snoezelen sessions	Improved behavioral rating immediately after treatment and for 3 weeks posttreatment	5

(continued)

behavioral management techniques to manage psychological symptoms is D.

TABLE 8. Studies of the Use of Sensory Stimulation in the Management of Neuropsychiatric Symptoms of Dementia *(continued)*

Author	Randomization	Comparison Group	Number of Patients	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Whall et al., 1997 (115)	No	Yes	15	16	Sounds of birds, brooks, and small animals and large bright pictures during baths	Significant reduction in agitation in treatment group, relative to the comparison group	4
Witucki and Twibell, 1997 (116)	No	Yes	15	Patients were their own comparison subjects.	Sensory stimulation activities (touch, smell, music)	Improved psychological well-being	4

[a] Levels of evidence were rated according to Oxford Centre for Evidence-Based Medicine guidelines and ranged from 1 to 5, with lower numbers indicating higher quality. Lowercase letters ("a," "b," "c"), used to designate level 1, 2, and 3 studies, indicate finer-quality gradations, with a range from "a" (higher quality) to "c" (lower quality).

Table 6 summarizes the results of nine studies (seven randomized, controlled trials) involving psychoeducation to teach caregivers how to change their interactions with patients with dementia. In one large trial, improvement in neuropsychiatric symptoms at 16 weeks was found, but the difference only approached significance (73). In a second trial, primarily powered to improve mental health in caregivers rather than in patients, improvement in neuropsychiatric symptoms occurred immediately after 12 weeks of training in stress management, dementia education, and coping skills but was not maintained at 3-month follow-up (69). A third, smaller trial examining the effects of an intervention with individual families found significant improvements at 6 months in mood and ideational disturbance (74). In a randomized, controlled trial of an educational program for family carers that included supportive counseling, psychoeducation and training in management strategies, and home visits, the rate of institutionalization of patients was decreased (70). The effect continued for 3 months but not 2 years. A fifth randomized, controlled trial involved psychoeducation, instruction to caregivers in how to change their interactions with the patient, or both (68). Patients' behavior improved at 6 months, but the difference only approached significance. The researchers attributed the nonsignificant result to the fact that the trial was a pilot study that had limited power. Another study examined the effects of caregiver psychoeducation in working with nursing home residents to enhance social activities and self-care; the intervention resulted in a decrease in agitation after 6 months (77). Finally, a level-1 study investigated a comprehensive support and counseling intervention for spouse caregivers that included problem solving, management of troublesome behavior, education, and increased practical support, followed by long-term support groups (78). Patients' neuropsychiatric symptoms were not directly measured, but the intervention was found to delay time to institutionalization by nearly a year. The other studies were noncontrolled and showed either improvement that approached significance or significant improvement (71, 72).

- The grade of recommendation for behavioral management techniques in the form of psychoeducation and teaching caregivers how to change their interactions with patients is A, because evidence from level-1, level-2, and level-4 studies consistently supports these interventions, and the effects have been shown to last months.

An uncontrolled study suggested that family counseling is helpful in reducing institutionalization of patients (76). In a nonrandomized, controlled trial, a family support group resulted in a decrease in problem behavior but not in depression (75).

- The grade of recommendation for family counseling is C, because the intervention is supported by two level-4 studies.

A single controlled study compared the effects of "admiral" nurses—specialists in treatment of dementia who worked in the community with persons caring for patients with dementia—to those of usual treatment and showed no effect on institutionalization of patients (79).

- The grade of recommendation for caregiver support by specialist nurses in the community is D.

Psychosocial Interventions

Sensory enhancement

Music/music therapy. Music/music therapy interventions (Table 7) included playing music from specific eras or particular genres, such as Big Band music, as part of activity sessions or at certain times of day, including mealtimes or bath times. Participants also played musical instruments, moved to music, or participated in composition and improvisation sessions. Of 24 music/music therapy interventions (15, 80–102), six were investigated in randomized, controlled trials (15, 84, 89, 92, 95, 98). All were small trials and showed improvements in disruptive behavior. In two, behavior was observed during the music sessions, but there was no evidence that benefit carried over after the sessions (84, 92). In three studies, behavioral change was observed outside of the music/music therapy session. In the first study, patients were significantly less agitated, both during and immediately after music/music therapy in which the music was chosen to fit the individuals' preference (89). The results of the second study were similar (95). In the third

TABLE 9. Studies of the Use of Simulated Presence Therapy and Therapeutic Activities in the Management of Neuropsychiatric Symptoms of Dementia

Author	Randomization	Comparison Group	Number of Patients	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Camberg et al., 1999 (117)	Yes	Yes	19	18 (placebo group), 18 (usual care group)	Simulated presence therapy for 17 days	No difference in agitated or withdrawn behaviors	2b
Miller et al., 2001 (118)	No	Yes	7	Patients were their own comparison subjects.	Modification of simulated presence therapy using audiotapes made by family members	Improved social interaction and attention-awareness during agitation after intervention	4
Woods and Ashley, 1995 (119)	No	No	27	Patients were their own comparison subjects.	Simulated presence therapy, with audiotapes when patient displayed agitation	Improvements in social isolation and agitation; no improvement in aggression	4
Woods and Ashley, 1995 (119)	No	Yes	9	Patients were their own comparison subjects.	Simulated presence therapy, with audiotapes played twice daily	Improvement in problem behaviors 91% of the time	4
Peak and Cheston, 2002 (120)	No	Yes	4 (single cases)	Patients were their own comparison subjects.	Simulated presence therapy, with audiotape played for 10 sessions	Results for four cases were inconsistent.	5
Hall, 1997 (121)	No	Yes	36	Patients were their own comparison subjects.	Simulated presence using videotape	Significant improvement in positive behaviors during and after video, but no differences in agitated behavior	4
Buettner and Fitzsimmons, 2002 (122)	Yes	Yes	35 in both groups in total; not clear how many in each group	35 in both groups in total; not clear how many in each group	Small-group discussion, then 15 minutes of biking (total of 1 hour a day, 5 days a week), followed by 10-week maintenance period that included biking twice a week	Significant reduction in depression at 10-week follow-up, no significant effects on agitation	2b
Fitzsimmons and Buettner, 2002 (123)	Yes	Yes	29	30	Therapeutic recreation activities	Significantly less agitation in activities group	2b
Ishizaki et al., 2002 (124)	No	Yes	14	11	Activity sessions at day-care center once a week	No change in depression	4
Kim et al., 2002 (125)	No	No	13	0	Day-care program (individualized and group interventions) for 10 weeks	Increase in agitation over 10-week period	4
Martichuski et al., 1996 (126)	No	Yes	51	Patients were their own comparison subjects.	Small-group activities led by nurses' assistants once a week	No behavioral change, but reduction in use of physical restraint and in use of psychotropics in seven of 20 patients	4
Sival et al., 1997 (127)	No	Yes	3	Patients were their own comparison subjects.	Wide variety of activities	After intervention, one patient was better, one was worse, and one had no change.	5

(continued)

TABLE 9. Studies of the Use of Simulated Presence Therapy and Therapeutic Activities in the Management of Neuropsychiatric Symptoms of Dementia *(continued)*

Author	Randomization	Comparison Group	Number of Patients	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Snyder et al., 2001 (128)	No	Yes	18	Patients were their own comparison subjects.	20 minutes per day on the glider swing	Immediate significant increase in enjoyment; no change in aggression at 5 days	4
Lawton et al., 1998 (129)	Yes	Yes	49	48	Activity programming, staff training, interdisciplinary care planning, family support	No significant effects on behavior	2b
Panella et al., 1984 (29)	No	No	69	0	Reality orientation therapy, validation therapy, family support, recreation therapy	Reduced institutionalization	4
Fitzgerald-Cloutier, 1993 (86)	No	Yes	1	Patient was own comparison subject.	Either music therapy or reading activity sessions	Less time spent in repetitive motor activities	5
Gardiner et al., 2000 (87)	No	Yes	2	Patients were their own comparison subjects.	Music therapy or reading/book exploration sessions	Both patients improved with reading	5
Lord and Garner, 1993 (95)	Yes	Yes	20 (puzzle-play)	20	Music therapy, puzzle-play sessions, standard treatment	No effect of puzzle-play on behavior	2b
Baker et al., 1997 (105)	Yes	Yes	31 in total (one-half were comparison subjects)	31 in total (one-half were comparison subjects)	Snoezelen therapy/ multisensory stimulation or general activity sessions	No effect of activity on behavior	2b

[a] Levels of evidence were rated according to Oxford Centre for Evidence-Based Medicine guidelines and ranged from 1 to 5, with lower numbers indicating higher quality. Lowercase letters ("a," "b," "c"), used to designate level 1, 2, and 3 studies, indicate finer-quality gradations, with a range from "a" (higher quality) to "c" (lower quality).

study, which assessed music, hand massage, or a combination of both for 10 minutes, decreased agitation was observed 1 hour after the intervention (98). All but one of the other studies (100) were controlled. Most of them found a benefit, although some did not (83).

- The grade of recommendation for music therapy for immediate amelioration of disruptive behavior is B, because consistent level-2 evidence suggests that music therapy decreases agitation during sessions and immediately after. There is, however, *no* evidence that music therapy is useful for treatment of neuropsychiatric symptoms in the longer term.

Snoezelen therapy/multisensory stimulation. Snoezelen therapy/multisensory stimulation (Table 8), which combines relaxation and exploration of sensory stimuli, such as lights, sounds, and tactile sensations, is based on the idea that neuropsychiatric symptoms may result from periods of sensory deprivation. Interventions occurred in specially designed rooms and lasted 30–60 minutes. Of six trials of Snoezelen therapy/multisensory stimulation, three were randomized, controlled trials. The first was a very small trial with no clear results (103). The other two found that disruptive behavior briefly improved outside the treatment setting but that there was no effect after the treatment had stopped (104, 105). The other reports described studies of individual cases (106, 107) and an uncontrolled trial in which improvements were found but no statistics were provided (108).

- The grade of recommendation for Snoezelen for amelioration of disruptive behavior immediately after the intervention is B, on the basis of consistent evidence from level-2 studies. The effects are apparent only for a very short time after the session.

Other sensory stimulation. Of seven trials of other forms of sensory stimulation (Table 8), three were randomized, controlled trials. The first trial compared massage with a comparison condition, music, or a combination of massage and music (98). Decreased agitation was observed 1 hour after the intervention. The second trial examined a sensory integration program that emphasized bodily responses, sensory stimulation, and cognitive stimulation; this intervention had no effect on behavior (112). Similarly, a small randomized, controlled trial found that white noise had no effect on sleep disturbance and nocturnal wandering (114). An "expressive physical touch" intervention (5.5 minutes/day of touching, including 2.5 minutes/day of

TABLE 10. Studies of the Use of Other Structured Activity and Alteration of the Visual Environment in the Management of Neuropsychiatric Symptoms of Dementia

Author	Randomization	Comparison Group	Number of Patients	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Cleary et al., 1988 (130)	No	Yes	11	Patients were their own comparison subjects.	Reduced stimulation unit, staff education	No reduction in agitation or change in medication but decreased restraint use	4
Cott et al., 2002 (131)	Yes	Yes	90	30	Walking/talking program	No significant behavioral changes	1b
Gorzelle et al., 2003 (132)	No	Yes	10	Patients were their own comparison subjects.	Caregivers trained in Montessori activities	No change in neuropsychiatric symptoms	4
Hopman-Rock et al., 1999 (133)	Yes	Yes	72	62	Psychomotor activation program	No overall effect on behavior	2b
Holmberg, 1997 (134)	No	Yes	11	Patients were their own comparison subjects.	Volunteer-led 90-minute outdoor walking sessions	No difference in aggressive incidents	4
Martichuski et al., 1996 (126)	No	Yes	51	Patients were their own comparison subjects.	Weekly small-group activities run by nursing assistants	No behavioral changes, decrease in physical restraint in all facilities, decrease in use of psychotropics in seven of 20 patients	4
Meyer et al., 1992 (135)	No	Yes	11	Patients were their own comparison subjects.	Quiet week intervention	Decreased agitation during the week	4
Namazi et al., 1994 (136)	No	Yes	11	11	Exercise/movement program daily for 40 minutes for 4 weeks	Significant decrease in agitation in exercise group	4
Okawa et al., 1991 (137)	No	No	24	0	Enforced social activity with nurses (3 hours/day)	Reduced behavioral problems in 30% of sample	5
Orsulic-Jeras et al., 2000 (138)	Partial	Yes	13	12	Montessori activities (group and individual)	No differences in depression or agitation	4
Cohen-Mansfield and Werner, 1998 (139)	No	Yes	27	Patients were their own comparison subjects.	Design of internal corridors in nursing home	No significant decrease in aggression/agitation	4
Dickinson et al., 1995 (140)	No	Yes	7	Patients were their own comparison subjects.	Blinds and cloth barriers used to cover doors/windows	Decrease in number of exit attempts	4
Hanley, 1981 (141)	No	Yes	6	Patients were their own comparison subjects.	Signposting, signposting plus training	Signposting alone was not effective; signposting plus training was associated with improvements for all patients. Improvement maintained at 3 months in two of four patients.	5
Hewawasam, 1996 (142)	No	Yes	10	Patients were their own comparison subjects.	Two-dimensional grid pattern by door of ward	Horizontal grid pattern was effective in reducing exiting behavior in all patients.	4
Hussain, 1988 (143)	No	Yes	5	Patients were their own comparison subjects.	Verbal/physical prompts to focus attention on cues and signposts	Problem behaviors were reduced in all patients during intervention period.	5

(continued)

TABLE 10. Studies of the Use of Other Structured Activity and Alteration of the Visual Environment in the Management of Neuropsychiatric Symptoms of Dementia *(continued)*

Author	Randomization	Comparison Group	Number of Patients	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Hussain and Brown, 1987 (144)	No	Yes	8	Patients were their own comparison subjects.	Two-dimensional grid pattern by door of ward	Ambulation was reduced in seven of eight patients with grids; pattern of eight horizontal lines was most effective.	4
Kincaid and Peacock, 2003 (145)	No	Yes	12	Patients were their own comparison subjects.	Murals painted over doors of ward	Significantly fewer door testings with mural	4
Kittur and Ruskin, 2001 (146)	No	Yes	2	Patients were their own comparison subjects.	Removing mirrors	Reduced agitation for 1 week in one patient	5
Mayer and Darby, 1991 (147)	No	Yes	9	Patients were their own comparison subjects.	Full-length mirror placed in front of door	Significant reduction in door contacts	4
Namazi et al., 1989 (148)	No	Yes	9	Patients were their own comparison subjects.	Nine types of visual barriers (grids, door knob cover, barriers)	Cloth covering door/door handle was most effective in reducing exiting behavior.	4
Williams et al., 1987 (149)	No	Yes	5	5	Environmental changes in ward (e.g., signposting) and informal reality orientation therapy with staff	Significant improvement in behavior in patients on intervention ward, relative to comparison group	4
Chafetz, 1990 (150)	No	Yes	30	30	Grid marking on floor by exit	No reduction in exiting behavior	4

[a] Levels of evidence were rated according to Oxford Centre for Evidence-Based Medicine guidelines and ranged from 1 to 5, with lower numbers indicating higher quality. Lowercase letters ("a," "b," "c"), used to designate level 1, 2, and 3 studies, indicate finer-quality gradations, with a range from "a" (higher quality) to "c" (lower quality).

gentle massage and 3 minutes/day of intermittent touching with some talking) over a 10-day period decreased disturbed behavior from baseline immediately and for 5 days after the intervention (111). White noise tapes led to immediate decrease in agitation (109). A controlled trial of stimulation with "natural elements" while bathing (sounds of birds, brooks, and small animals were played and large bright pictures were displayed) found that agitation decreased significantly only during bathing (115). The other study of single cases found no difference in agitation before and after therapeutic touch or massage (113). In the final two studies, the effects of several forms of sensory stimulation involving touch, smell, and taste were examined. A small randomized, controlled trial reported no change associated with the intervention (110), and the other study found that the intervention was helpful (116).

- The grade of recommendation for short-term benefits of sensory stimulation is C, but there is no evidence for sustained usefulness.

Simulated presence therapy. Six studies investigated the effects of simulated presence therapy, in which positive autobiographical memories are presented to the patient in the form of a telephone conversation usually involving a continuous-play audiotape made by a family member or surrogate (Table 9). One randomized, controlled trial found no change in agitated or withdrawn behaviors (117). Staff observations suggested reduced agitation in patients who received the intervention, compared to a placebo group but not compared to patients receiving usual care (117). A small study found improved social interaction and attention (118). Simulated presence therapy used to address agitation led to significant decreases in agitation and improved social interaction but no change in aggressive behaviors (119). When simulated presence therapy was used regularly, problem behaviors were reduced by 91% (119). Finally, in a series of single case studies, Peak and Cheston (120) reported mixed results, with increased ill-being in one participant and reduced anxiety and increased social interaction in other participants. Use of video to provide simulated presence was not associated with significant changes in agitated behavior (121).

- The grade of recommendation for simulated presence therapy is D.

Structured activity

Therapeutic activity programs. There were five randomized, controlled trials of therapeutic activities (Table 9). In a small-scale randomized, controlled trial, therapeutic activities at home were associated with significant decreases in agitation (123). Another study found that small group discussion and being carried on a bicycle pedaled by volunteers alleviated patients' depression but

TABLE 11. Studies of the Use of Other Environmental Manipulation and Staff Education in the Management of Neuropsychiatric Symptoms of Dementia

Author	Randomization	Comparison Group	Number of Patients	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Annerstedt, 1997 (151)	No	Yes	28	29	Designed environment (group living)	At 1 year, reduced aggression, anxiety, and depression; lower costs; and reduced use of neuroleptics for group living patients; no difference at 3 years	4
Annerstedt, 1993 (152)	No	Yes	28	28	Designed environment (group living)	Reduced institutionalization and slight reduction in anxiety and depression in group living patients; increase in aggression in group living patients, but increase was less than in the comparison group	4
Bianchetti et al., 1997 (153)	No	No	17	0	Designed environment	Significant reduction in behavioral problems, use of psychotropics, and use of physical restraints at 6 months	4
Namazi and Johnson, 1992 (154)	No	No	32	0	Doors unlocked for 3-hour periods	Reduction in negative and aggressive behaviors and in wandering when door unlocked	4
Wells and Jorm, 1987 (155)	Yes	Yes	12	10	Specialized design	No differences in problem behaviors	2b
Wimo et al., 1995 (156)	No	Yes	46	62	Group living	Significant increase in behavioral disturbances in group living patients versus comparison subjects at 6 and 9 months; aggression significantly increased in group living patients after 6 and 12 months	4
Benson et al., 1987 (157)	No	Yes	32	Patients were their own comparison subjects	Specialized care plans for each patient, education for nurses, family support and education	Emotional status significantly increased at 12 months; increased quality of life	4
Brane et al., 1989 (158)	No	Yes	17	19	Staff training in integrity in promoting care	Improvement in anxiety and depressed mood in treatment group	4
Cohen-Mansfield et al., 1997 (159)	No	No	Not stated	Not stated	Training program for 103 nursing staff members	No change in patients' agitation or mood; significant increase in restraint at follow-up	4

(continued)

not agitation at 10 weeks (122). The third found no effects of puzzle play on social interaction and mood (95). Similarly, a comparison of games and puzzle play with Snoezelen and another study comparing structured activity with a control condition found no improvements in mood and behavior (104, 129).

The other studies of therapeutic activities were nonrandomized, controlled trials. Ishizaki et al. (124) found

TABLE 11. Studies of the Use of Other Environmental Manipulation and Staff Education in the Management of Neuropsychiatric Symptoms of Dementia *(continued)*

Author	Randomization	Comparison Group	Number of Patients	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Edberg and Hallberg, 2001 (160)	No	Yes	11	11	Staff training, individualized care plans, clinical supervision	No difference between groups	4
Hagen and Sayers, 1995 (161)	No	Yes	171 caregivers	Not stated	Staff education for 171 staff members	Significant reduction in aggression directed toward staff 2 weeks after program	4
Matthews et al., 1996 (162)	No	Yes	33	Patients were their own comparison subjects.	Staff educated to provide client-centered care to address agitation and sleep problems	Significant reduction in verbal agitation 6–8 weeks postintervention, increase in other agitated behaviors, no change in sleep	4
McCallion et al., 1999 (163)	Yes	Yes	49 nursing assistants	56 nursing assistants	Manual-guided course for nursing assistants	Significant reduction in disturbances and aggression at 3 months and in depression at 6 months; no change in use of restraint	1b
Schrijnemaekers et al., 2002 (164)	Yes	Yes	77	74	Training in emotion-focused care	No difference between groups at 3, 6, and 12 months	2b
Testad et al., 2005 (165)	Yes	Yes	140	140	Staff education program	Reduced use of restraint in the treatment group; no change in agitation score postintervention	2b

[a] Levels of evidence were rated according to Oxford Centre for Evidence-Based Medicine guidelines and ranged from 1 to 5, with lower numbers indicating higher quality. Lowercase letters ("a," "b," "c"), used to designate level 1, 2, and 3 studies, indicate finer-quality gradations, with a range from "a" (higher quality) to "c" (lower quality).

no beneficial effects of weekly therapeutic activities on depression. In another study, a combination of group and individualized activity sessions in day care significantly increased agitation over 10 weeks (125). A controlled, nonrandomized clinical trial of weekly activity groups led by nursing assistants found no behavioral changes (126). There was, however, less use of physical restraint generally, and psychotropic medication use was reduced in seven of 20 participants. A specialist day-care program providing structured daily activities for patients with dementia was associated with decreased institutionalization and was more cost-effective than nursing home care (29). Patients who were rocked on a swing did not show a decrease in aggression (128). Three case studies of diverse group activities (games, music, exercise, socializing) found equivocal effects on behavior (127). In two studies that used reading sessions as an intervention, some improvement was seen in wandering (86) and disruptive behaviors were decreased in both patients in the study both during and 1 week after the reading intervention (87).

- Not all therapeutic activity programs used the same interventions, but overall, the study findings are inconsistent and inconclusive. The grade of recommendation is D.

Montessori activities. Montessori activities use rehabilitation principles and make extensive use of external cues and progression in activities from simple to complex (Table 10). Three nonrandomized, controlled trials utilized Montessori-based activities and found no change in depression and agitation (132, 135, 138).

- The grade of recommendation for Montessori activities is D.

Exercise. Three studies examined the use of exercise/movement/walking as an intervention for neuropsychiatric symptoms (Table 10). A well-conducted randomized, controlled trial found no effects on behavior in a "walk-talk" program in which one caregiver walked with two residents or walked and talked with two residents (131). A randomized, controlled trial of a psychomotor activation program found no behavioral effect (133). The other two studies were nonrandomized, controlled trials. One study, in which 11 patients were their own comparison subjects, found a significant reduction in aggressive behaviors on days when a walking group was held (134). The other study, a small matched, con-

TABLE 12. Studies of the Use of Special Care Units Combined With Staff Education in the Management of Neuropsychiatric Symptoms of Dementia

Author	Randomization	Comparison Group	Number of Patients	Number of Comparison Subjects	Therapeutic Regimen	Outcome	Level of Evidence[a]
Annerstedt et al., 1996 (166)	No	Yes	28	31	Designed environment and staff training	Improvement in emotional functioning at 6 months, no difference at 12 months; increased use of medication in comparison group; group living less costly	3
Bellelli et al., 1998 (167)	No	No	55	0	Designed environment, staff training, activity provision	Reduction in behavioral disturbances (measured with neuropsychiatric inventory), especially agitation and aberrant motor behavior, in special care dementia units at 6-month follow-up; reduced neuroleptic medication use	4
Chafetz, 1991 (168)	No	Yes	12	8	Special care dementia units with designed environment, staff training, family involvement	No difference in problem behavior at 15-month follow-up	4
Frisoni et al., 1998 (169)	No	Yes	31	35	Special care dementia units with designed environment, staff training, family involvement	Reduction in neuropsychiatric symptoms in both groups after 3 months; reduction in depression and improvement in psychotic symptoms in special care dementia units, no change in use of physical restraints in special care dementia units, increase in use of physical restraints in comparison group	3
Kovach and Stearns, 1994 (170)	No	Yes	26	Not specified	Specialist dementia care unit, staff training	Significant reduction in behavioral problems was found at time 2 (not clear when); biggest reduction was in activity disturbance and aggression.	4
Morgan and Stewart, 1998 (171)	No	Yes	52	11	Low-density special care dementia units	Reduction in disruptive behavior in low-density group at 1 year	3
Warren et al., 2001 (172)	No	Yes	44	36	Admission to special care dementia units	Behavioral and depression scores did not significantly change for special care dementia units residents at 18 months.	3
Webber et al., 1995 (173)	No	Yes	22	Not specified	Specialized unit design, staffing, and activity programming	No significant differences in neuropsychiatric symptoms between special care dementia units and standard care at 6 months	4

[a] Levels of evidence were rated according to Oxford Centre for Evidence-Based Medicine guidelines and ranged from 1 to 5, with lower numbers indicating higher quality.

trolled trial of exercise groups, found no significant reduction in agitated behaviors (136).

- The grade of recommendation for exercise is D.

Social interaction. A small report of single cases studies showed decreased neuropsychiatric symptoms in one-third of patients who had enforced social interaction with nurses for 3 hours/day for 1–2 months (137).

- The grade of recommendation for enforced social interaction is D.

Decreased sensory stimulation. Two small studies investigated decreased sensory stimulation (Table 10). A "quiet

week" intervention (turning off the television, lowering voices. and reducing fast movement by staff at a day center) led to an immediate significant reduction in agitation as measured by a nonstandardized scale, compared to the period before the intervention (135). In another study, patients on a specially designed reduced stimulation unit—without television, radio, telephones; with scheduled rest periods and limited access to visitors—had no reduction in neuropsychiatric symptoms as measured by a standardized scale, compared with the period before the intervention, but use of restraint decreased (130).

- The grade of recommendation for decreased sensory stimulation is D.

Environmental manipulation. *Visually complex environments.* Eight studies (no randomized, controlled trials) investigated the effects of changing the visual environment (Table 10). The presence of two-dimensional grids on the floor near doors did not reduce exiting behaviors (150). However, two studies in which a horizontal grid pattern was used reported significant decreases in patients' attempts to open doors and in patients' ambulation (142, 144). Similar results were found in a study of the effects of murals on the walls above doorways (145). Blinds and cloth barriers placed over doors/door handles and signs installed to provide a focus of patients' attention were also effective in reducing time spent attempting to exit the ward (140, 143, 148). Enhancement of the visual environment in a selected area of a residential home was associated with a decrease in agitated behaviors, although the finding was not statistically significant (139).

- Consistent evidence from level-4 studies for changing the environment to obscure the exit indicates a grade of recommendation of C.

Mirrors. Two small nonrandomized, controlled trials investigated the effects of mirrors in the patient's environment (Table 10). In a study with a single case design, one of two patients was less agitated after removal of mirrors from the ward environment (146). Placing a full-length mirror over a doorway led to a significant decrease in exiting during the intervention for nine patients (147).

- The grade of recommendation for use of mirrors is D.

Signposting. Three nonrandomized, controlled trials investigated the effects of signposting on neuropsychiatric symptoms (Table 10). Two single case studies found that signposting alone was ineffective, but signposting in combination with reality orientation therapy led to improvements in ward orientation in two of four and five of five patients, respectively (141, 149). In the third study, signposts were placed alongside prompts that served to draw attention to the signs; this arrangement led to a reduction in neuropsychiatric symptoms in all five study participants (143).

- The grade of recommendation for signposting is D.

Other environmental manipulations. *Group living.* Group living is the name given to specially designed nursing homes that encourage a homelike atmosphere (Table 11). In a randomized, controlled trial, no change in neuropsychiatric symptoms was found in those in a group living setting, compared to community-dwelling waiting-list comparisons (155). Two other randomized, controlled trials showed decreased aggression, anxiety, and depression and less use of neuroleptic medication for 1 year in residents in group living settings (151, 152). No differences between group living and comparison subjects were observed 3 years later. Both studies were limited, because residents were selected for admission and were ineligible if they had frontal lobe symptoms, severe dementia, or a severe physical morbidity. A smaller uncontrolled trial of group living reported beneficial effects on neuropsychiatric symptoms at 6 months and reduced use of physical restraints (153). However, in another study, neuropsychiatric symptoms significantly *increased* in group living subjects, relative to comparison subjects, at 6 months and 1 year (156). In summary, group living may have beneficial or deleterious effects—or no effect—on neuropsychiatric symptoms.

- The grade of recommendation for group living is D.

Unlocking doors. One small uncontrolled study examined the effect of unlocking ward doors for 3-hour periods (154) (Table 11). Patients showed fewer neuropsychiatric symptoms and decreased wandering when the door was open (154).

- The grade of recommendation for unlocking doors is D.

Staff education in managing behavioral problems. Nine studies investigated the effects of staff education in treatment of neuropsychiatric symptoms. Three of the studies were randomized, controlled trials (163–165) (Table 11). A randomized, controlled trial of communication skills training for nursing and auxiliary staff showed significant reductions in patients' aggression at 3 months and in patients' depression at 6 months (163). Education of staff to implement an emotion-focused care program (validation, reminiscence, sensory stimulation) did not result in any change in neuropsychiatric symptoms (164). Staff education programs focused on knowledge of dementia and potential management strategies reduced use of physical restraint use (165) and, in a nonrandomized, controlled trial, decreased aggressive behavior toward staff (161). Specialized care programs for individuals in a residential home plus staff education improved emotional status and quality of life for residents 12 months later (157). A similar approach in a controlled trial with only 11 people in each arm led to nonsignificant differences favoring the intervention group (160). The result of a client-centered approach to agitation and sleep disturbance for 33 residents of a nursing home was equivocal. Verbal aggression decreased significantly, but the (less frequent) episodes of

nonverbal agitation increased (162). Training staff in integrity-promoting care (staff gave more time, made the environment more homelike, encouraged patients to do more and to wear their own clothes) improved patients' anxiety and depressed mood in a small controlled trial (158). In a large uncontrolled trial, training for nursing staff in using unstandardized observational outcomes led to an increase in restraint use but had no effect on agitated behavior (159).

- The grade of recommendation for specific staff education programs in managing neuropsychiatric symptoms is B, on the basis of consistent evidence from level-1 and level-2 studies, as well as supportive evidence from level-4 studies.

Environmental interventions combined with staff education. Eight nonrandomized, controlled trials investigated the effects of environmental interventions such as special care units designed for patients with dementia and staffed by specially trained workers who received ongoing training (Table 12). In a controlled trial, admission to a "low-density" special care dementia unit, which had fewer residents and larger living areas than standard units, was associated with a decrease in disruptive behavior (171). Similarly, in a controlled trial, a combination of group living and staff training was found to improve patients' emotional and physical outcomes and was less costly than standard care (166, 167). In other studies, special care dementia units were associated with a reduction in neuropsychiatric symptoms, especially agitation and depression, and with a reduction in use of neuroleptic medication (167, 169). Aggression and activity disturbances were reduced in a small controlled trial of a special care dementia unit care (170). However, three other studies found no effect (168, 172, 173).

- The grade of recommendation for special care units combined with staff education is D.

Discussion

We found numerous studies reporting psychological approaches to neuropsychiatric symptoms. We have tried to summarize and classify these studies using evidence-based guidelines in order to help clinicians understand which interventions are efficacious and over what time period. We also tried to distinguish interventions that are ineffective from interventions for which too little evidence is available to judge their effectiveness. Because some interventions are made up of several elements, we could have classified them in different ways. We tried to use the best fit and, by describing the interventions, to make our judgments transparent. Some therapies may require a huge amount of work for very little benefit, and we did not measure this aspect. In addition, some therapies may provide pleasure (either for the patients with dementia or for staff members) and thus may be worthwhile even if the intervention does not alter the patients' neuropsychiatric symptoms. We did not attempt to judge these differential effects. Similarly, we did not study cognition as an endpoint, although some therapies are intended to have an effect on cognition.

Effective Psychological Therapies

Behavioral management techniques centered on individual patients' behavior are generally successful for reduction of neuropsychiatric symptoms, and the effects of these interventions last for months, despite qualitative disparity. Psychoeducation intended to change caregivers' behavior is effective, especially if it is provided in individual rather than group settings, and improvements in neuropsychiatric symptoms associated with these interventions are sustained for months. We therefore recommend these types of interventions.

Music therapy and Snoezelen, and possibly some types of sensory stimulation, are useful treatments for neuropsychiatric symptoms during the session but have no longer-term effects. The cost or complexity of Snoezelen for such small benefit may be a barrier to its use.

Specific types of staff education lead to reductions in behavioral symptoms and use of restraints and to improved affective states. Staff education is, however, heterogeneous, although instruction for staff in communication skills and enhancement of staff members' knowledge about dementia may improve many outcomes related to neuropsychiatric symptoms. Teaching staff to use dementia-specific psychological therapies for which there is limited evidence of efficacy may not improve these outcomes.

What Interventions Need More Evidence?

Little evidence is available on the effectiveness of reminiscence therapy, but more positive evidence exists for cognitive stimulation therapy. Training for caregivers in behavioral management techniques had inconsistent outcomes but merits further study. The evidence for therapeutic activities is very mixed, and the study findings for these interventions are contradictory and inconclusive. Specialized dementia units were not consistently beneficial, but changing the environment visually and unlocking doors successfully reduced wandering in institutions. These promising interventions merit more study. There is no convincing evidence that simulated presence interventions or reduced stimulation units are efficacious for neuropsychiatric symptoms.

Which Interventions Were Ineffective?

Reality orientation therapy, validation therapy, "admiral" nurses, and Montessori activities had no effect on neuropsychiatric symptoms. In addition, convincing evidence suggests that simple repetitive exercise does *not* work for neuropsychiatric symptoms.

Conclusions

Overall our conclusions are limited because of the paucity of high-quality research. We found only nine studies with level-1 evidence. However, lack of evidence of efficacy does not mean lack of efficacy. Because the system of rating research assigns the highest ratings to randomized, controlled trials, most published studies of psychological interventions will not be rated as having the highest quality. The literature on behavioral interventions places greater weight on experimental single case studies, particularly in describing individualized interventions. The purpose of publication, however, is to provide evidence that can be generalized for future use. We have, therefore, used the Oxford Centre for Evidence-Based Medicine's system for assessing evidence. We encourage the use of standardized interventions (which can be individualized within a context of adherence to basic principles) in future research so that interventions found to be effective can be used in other populations.

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References

1. Finkel S, Costa e Silva J, Cohen G, Miller S, Sartorius N: Behavioral and psychological signs and symptoms of dementia: a consensus statement on current knowledge and implications for research and treatment. Int Psychogeriatr 1996; 8(suppl 3): 497–500
2. Lyketsos CG, Steinberg M, Tschanz JT, Norton MC, Steffens DC, Breitner JCS: Mental and behavioral disturbances in dementia: findings from the Cache County Study on Memory in Aging. Am J Psychiatry 2000; 157:708–714
3. Lyketsos C, Lopez O, Jones B, Fitzpatrick A, Breitner J, DeKosky S: Prevalence of neuropsychiatric symptoms in dementia and mild cognitive impairment. JAMA 2002; 288:1475–1483
4. Margallo-Lana M, Reichelt K, Hayes P, Lee L, Fossey J, O'Brien J, Ballard C: Longitudinal comparison of depression, coping, and turnover among NHS and private sector staff caring for people with dementia. BMJ 2001; 322:769–770
5. Lawlor B: Managing behavioural and psychological symptoms in dementia. Br J Psychiatry 2000; 181:463–465
6. Coen R, Swanwick G, O'Boyle C, Coakley D: Behaviour disturbance and other predictors of caregiver burden in Alzheimer's disease. Int J Geriatr Psychiatry 1997; 12:331–336
7. O'Donnell B, Drachman D, Barned H: Incontinence and troublesome behavior predict institutionalization in dementia. J Geriatr Psychiatry Neurol 2004; 5:45–52
8. Lopez OL, Wisniewski SR, Becker JT, Boller F, DeKosky ST: Psychiatric medication and abnormal behavior as predictors of progression in probable Alzheimer's disease. Arch Neurol 1999; 56:1266–1272
9. Smith DA, Beier MT: Association between risperidone treatment and cerebrovascular adverse events: examining the evidence and postulating hypotheses for an underlying mechanism. J Am Med Dir Assoc 2004; 5:129–132
10. Wooltorton E: Risperidone (Risperdal): increased rate of cerebrovascular event in dementia trials. CMAJ 2002; 167:1269–1270
11. Moher D, Jadad A, Nichol G, Penman M, Tugwell P, Walsh S: Assessing the quality of randomized controlled trials: an annotated bibliography of scales and checklists. Control Clin Trials 1995; 16:62–73
12. Brooker D, Duce L: Wellbeing and activity in dementia: a comparison of group reminiscence therapy, structured goal-directed group activity and unstructured time. Aging Ment Health 2000; 4:354–358
13. Baines S, Saxby P, Ehlert K: Reality orientation and reminiscence therapy: a controlled cross-over study of elderly confused people. Br J Psychiatry 1987; 151:222–231
14. Goldwasser AN, Auerbach SM, Harkins SW: Cognitive, affective, and behavioral effects of reminiscence group therapy on demented elderly. Int J Aging Hum Dev 1987; 25:209–222
15. Korb C: The influence of music therapy on patients with a diagnosed dementia. Can J Music Therapy 1997; 5:26–54
16. Haight BK, Bachman DL, Hendrix S, Wagner MT, Meeks A, Johnson J: Life review: treating the dyadic family unit with dementia. Clin Psychol Psychother 2003; 10:165–174
17. Babins L: Conceptual analysis of validation therapy. Int J Aging Hum Dev 1988; 26:161–168
18. Morton I, Bleathman C: The effectiveness of validation therapy in dementia: a pilot study. Int J Geriatr Psychiatry 1991; 6:327–330
19. Toseland RW, Diehl M, Freeman K, Manzanares T, Naleppa M, McCallion P: The impact of validation group therapy on nursing home residents with dementia. J Appl Gerontol 1997; 16: 31–50
20. Baldelli MV, Piriani A, Motta M, Abati E, Mariani E, Manzi V: Effects of reality orientation therapy on elderly patients in the community. Arch Gerontol Geriatr 1993; 17:211–218
21. Brook P, Degun G, Mather M: Reality orientation, a therapy for psychogeriatric patients: a controlled study. Br J Psychiatry 1975; 127:42–45
22. Greene JG, Nicol R, Jamieson H: Reality orientation with psychogeriatric patients. Behav Res Ther 1979; 17:615–618
23. Greene JG, Timbury GC, Smith R, Gardiner M: Reality orientation with elderly patients in the community: an empirical evaluation. Age Ageing 1983; 12:38–43
24. Hanley IG, McGuire RJ, Boyd WD: Reality orientation and dementia: a controlled trial of two approaches. Br J Psychiatry 1981; 138:10–14
25. Ishizaki J, Meguro K, Ishii H, Yamaguchi S, Shimada M, Yamadori A, Yambe Y, Yamazaki H: The effects of group work therapy in patients with Alzheimer's disease (letter). Int J Geriatr Psychiatry 2000; 15:532–535
26. Johnson CH, McLaren SM, McPherson FM: The comparative effectiveness of three versions of "classroom" reality orientation. Age Ageing 1981; 10:33–35
27. Metitieri T, Zanetti O, Geroldi C, Frisoni GB, De Leo D, Dello Buono M, Bianchetti A, Trabucchi M: Reality orientation therapy to delay outcomes of progression in patients with dementia: a retrospective study. Clin Rehabil 2001; 15:471–478
28. Reeve W, Ivison D: Use of environmental manipulation and classroom and modified informal reality orientation with institutionalized, confused elderly patients. Age Ageing 1985; 14: 119–121

29. Panella JJ Jr, Lilliston BA, Brush D, McDowell FH: Day care for dementia patients: an analysis of a four-year program. J Am Geriatr Soc 1984; 32:883–886
30. Mitchell LA, Maercklein G: The effect of individualized special instruction on the behaviors of nursing home residents diagnosed with dementia. Am J Alzheimers Dis Other Demen 1996; 11:23–31
31. Quayhagen MP, Quayhagen M, Corbeil RR, Roth PA, Rodgers JA: A dyadic remediation program for care recipients with dementia. Nurs Res 1995; 44:153–159
32. Quayhagen MP, Quayhagen M, Corbeil RR, Hendrix RC, Jackson JE, Snyder L, Bower D: Coping with dementia: evaluation of four nonpharmacologic interventions. Int Psychogeriatr 2000; 12:249–265
33. Romero B, Wenz M: Self-maintenance therapy in Alzheimer's disease. Neuropsychol Rehabil 2001; 11:333–355
34. Spector A, Orrell M, Davies S, Woods RT: Can reality orientation be rehabilitated? development and piloting of an evidence-based programme of cognition-based therapies for people with dementia. Neuropsychol Rehabil 2001; 11:377–379
35. Spector A, Thorgrimsen L, Woods B, Royan L, Davies S, Butterworth M, Orrell M: Efficacy of an evidence-based cognitive stimulation therapy programme for people with dementia: randomised controlled trial. Br J Psychiatry 2003; 183:248–254
36. Beck CK, Vogelpohl TS, Rasin JH, Uriri JT, O'Sullivan P, Walls R, Phillips R, Baldwin B: Effects of behavioral interventions on disruptive behavior and affect in demented nursing home residents. Nurs Res 2002; 51:219–228
37. Benedict RHB, Shapiro A, Priore R, Miller C, Munschauer F, Jacobs L: Neuropsychological counselling improves social behavior in cognitively-impaired multiple sclerosis patients. Mult Scler 2000; 6:391–396
38. DeYoung S, Just G, Harrison R: Decreasing aggressive, agitated, or disruptive behavior: participation in a behavior management unit. J Gerontol Nurs 2002; 28:22–31
39. Hoeffer B, Rader J, McKenzie D, Lavelle M, Stewart B: Reducing aggressive behaviour during bathing cognitively impaired nursing home residents. J Gerontol Nurs 1997; 23:16–23
40. Mishara BL: Geriatric patients who improve in token economy and general milieu treatment programs: a multivariate analysis. J Consult Clin Psychol 1978; 46:1340–1348
41. Rogers JC, Holm MB, Burgio LD, Granieri E, Hsu C, Hardin JM, McDowell BJ: Improving morning care routines of nursing home residents with dementia. J Am Geriatr Soc 1999; 47: 1049–1057
42. Suhr J, Anderson S, Tranel D: Progressive muscle relaxation in the management of behavioural disturbance in Alzheimer's disease. Neuropsychol Rehabil 1999; 9:31–44
43. Teri L, Logsdon RG, Uomoto J, McCurry SM: Behavioral treatment of depression in dementia patients: a controlled clinical trial. J Gerontol B Psychol Sci Soc Sci 1997; 52:159–166
44. Teri L: Behavioral treatment of depression in patients with dementia. Alzheimer Dis Assoc Disord 1994; 8(suppl 3):66–74
45. Welden S, Yesavage JA: Behavioral improvement with relaxation training in senile dementia. Clin Gerontol 1982; 1:45–49
46. Alexopoulos P: Management of sexually disinhibited behavior by a dementia patient. Aust J Ageing 1994; 13:119
47. Bakke BL, Kvale S, Burns T, McCarten JR, Wilson L, Maddox M, Cleary J: Multicomponent intervention for agitated behavior in a person with Alzheimer's disease. J Appl Behav Anal 1994; 27: 175–176
48. Birchmore T, Clague S: A behavioural approach to reduce shouting. Nurs Times 1983; 79:37–39
49. Bird M, Alexopoulos P, Adamowicz J: Success and failure in 5 case-studies: use of cued-recall to ameliorate behavior problems in senile dementia. Int J Geriatr Psychiatry 1995; 10:305–311
50. Boehm S, Whall AL, Cosgrove KL, Locke JD, Schlenk EA: Behavioral analysis and nursing interventions for reducing disruptive behaviors of patients with dementia. Appl Nurs Res 1995; 8: 118–122
51. Buchanan JA, Fisher JE: Functional assessment and noncontingent reinforcement in the treatment of disruptive vocalization in elderly dementia patients. J Appl Behav Anal 2002; 35:99–103
52. Carpenter B, Ruckdeschel K, Ruckdeschel H, Van Haitsma K: R-E-M psychotherapy: a manualized approach for long-term care residents with depression and dementia. Clin Gerontol 2003; 25:25–49
53. Doyle C, Zapparoni T, O'Connor D, Runci S: Efficacy of psychosocial treatments for noisemaking in severe dementia. Int Psychogeriatr 1997; 9:405–422
54. Heard K, Watson TS: Reducing wandering by persons with dementia using differential reinforcements. J Appl Behav Anal 1999; 32:381–384
55. Jozsvai E, Richards B, Leach L: Behavior management of a patient with Creutzfeldt-Jacob disease. Clin Gerontol 1996; 16:11–17
56. Kipling T, Bailey M, Charlesworth G: The feasibility of a cognitive behavioural therapy group for men with mild/moderate cognitive impairment. Behavioural & Cognitive Psychotherapy 1999; 27:189–193
57. Koder DA: Treatment of anxiety in the cognitively impaired elderly: can cognitive-behavior therapy help? Int Psychogeriatr 1998; 10:173–182
58. Lundervold DA, Jackson T: Use of applied behaviour analysis in treating nursing home residents. Hosp Community Psychiatry 1992; 43:171–173
59. Moniz-Cook E, Woods R, Richards K: Functional analysis of challenging behaviour in dementia: the role of superstition. Int J Geriatr Psychiatry 2001; 16:45–56
60. Wisner E, Green M: Treatment of a demented patient's anger with cognitive-behavioral strategies. Psychol Rep 1986; 59(2, part 1):447–450
61. Bourgeois MS, Burgio LD, Schulz R, Beach S, Palmer B: Modifying repetitive verbalizations of community-dwelling patients with AD. Gerontologist 1997; 37:30–39
62. Gormley N, Lyons D, Howard R: Behavioural management of aggression in dementia: a randomized controlled trial. Age Ageing 2001; 30:141–145
63. 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. Int J Geriatr Psychiatry 2003; 18:337–345
64. Teri L, Uomoto JM: Reducing excess disability in dementia patients: training caregivers to manage patient depression. Clin Gerontol 1991; 10:49–63
65. Teri L, Logsdon RG, Peskind E, Raskind M, Weiner MF, Tractenberg RE, Foster NL, Schneider LS, Sano M, Whitehouse P, Tariot P, Mellow AM, Auchus AP, Grundman M, Thomas RG, Schafer K, Thal LJ (Alzheimer's Disease Cooperative Study): Treatment of agitation in AD: a randomized, placebo-controlled clinical trial. Neurology 2000; 55:1271–1278; correction, 2001; 56:426
66. Teri L, Gibbons L, McCurry SM, Logsdon RG, Buchner DM, Barlow WE, Kukull WA, LaCroix AZ, McCormick W, Larson EB: Exercise plus behavioral management in patients with Alzheimer's disease: a randomized controlled trial. JAMA 2003; 290:2015–2022
67. Weiner MF, Tractenberg RE, Sano M, Logsdon R, Teri L, Galasko D, Gamst A, Thomas R, Thal LJ: No long-term effect of behavioral treatment on psychotropic drug use for agitation in Alzheimer's disease patients. J Geriatr Psychiatry Neurol 2002; 15: 95–98

68. Burgener SC, Bakas T, Murray C, Dunahee J, Tossey S: Effective caregiving approaches for patients with Alzheimer's disease. Geriatr Nurs 1998; 19:121–126
69. Marriot 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. Br J Psychiatry 2000; 176:557–562
70. Eloniemi-Sulkava U, Notkola IL, Hentinen M, Kivela SL, Sivenius J, Sulkava R: Effects of supporting community-living demented patients and their caregivers: a randomized trial. J Am Geriatr Soc 2001; 49:1282–1287
71. Ghatak R: Effects of an intervention program on dementia patients and their caregivers. Caring 1994; 13:34–39
72. Haupt M, Karger A, Janner M: Improvement of agitation and anxiety in demented patients after psychoeducative group intervention with their caregivers. Int J Geriatr Psychiatry 2000; 15:1125–1129
73. Hebert R, Levesque L, Vezina J, Lavoie JP, Ducharme F, Gendron C, Preville M, Voyer L, Dubois MF: Efficacy of a psychoeducative group program for caregivers of demented persons living at home: a randomized controlled trial. J Gerontol B Psychol Sci Soc Sci 2003; 58:S58–S67
74. McCallion P, Toseland RW, Freeman K: An evaluation of a family visit education program. J Am Geriatr Soc 1999; 47:203–214
75. Droes RM, Breebaart E, Ettema TP, van Tilburg W, Mellenbergh GJ: Effect of integrated family support versus day care only on behavior and mood of patients with dementia. Int Psychogeriatr 2000; 12:99–115
76. Ferris SH, Steinberg G, Shulman E, Kahn R, Reisberg B: Institutionalization of Alzheimer's disease patients: reducing precipitating factors through family counseling. Home Health Care Serv Q 1987; 8:23–51
77. Wells DL, Dawson P, Sidani S, Craig D, Pringle D: Effects of an abilities-focused program of morning care on residents who have dementia and on caregivers. J Am Geriatr Soc 2000; 48: 442–449
78. Mittelman MS, Ferris SH, Shulman E, Steinberg G, Levin B: A family intervention to delay nursing home placement of patients with Alzheimer disease: a randomized controlled trial. JAMA 1996; 276:1725–1731
79. Woods RT, Wills W, Higginson IJ, Hobbins J, Whitby M: Support in the community for people with dementia and their carers: a comparative outcome study of specialist mental health service interventions. Int J Geriatr Psychiatry 2003; 18:298–307
80. Ashida S: The effect of reminiscence music therapy sessions on changes in depressive symptoms in elderly persons with dementia. J Music Ther 2000; 37:170–182
81. Brotons M, PickettCooper PK: The effects of music therapy intervention on agitation behaviors of Alzheimer's disease patients. J Music Ther 1996; 33:2–18
82. Casby JA, Holm MB: The effect of music on repetitive disruptive vocalizations of persons with dementia. Am J Occup Ther 1994; 48:883–889
83. Clair AA, Bernstein B: The effect of no music, stimulative background music and sedative background music on agitated behaviours in persons with severe dementia. Activities, Adaptation and Aging 1994; 19:61–70
84. Clark ME, Lipe AW, Bilbrey M: Use of music to decrease aggressive behaviors in people with dementia. J Gerontol Nurs 1998; 24:10–17
85. Denney A: Quiet music: an intervention for mealtime agitation? J Gerontol Nurs 1997; 23:16–23
86. Fitzgerald-Cloutier ML: The use of music therapy to decrease wandering: an alternative to restraints. Music Therapy Perspectives 1993; 11:32–36
87. Gardiner JC, Furois M, Tansley DP, Morgan B: Music therapy and reading as intervention strategies for disruptive behavior in dementia. Clin Gerontol 2000; 22:31–46
88. Gaebler HC, Hemsley DR: The assessment and short-term manipulation of affect in the severely demented. Behavioural Psychotherapy 1991; 19:145–156
89. Gerdner LA: Effects of individualized versus classical "relaxation" music on the frequency of agitation in elderly persons with Alzheimer's disease and related disorders. Int Psychogeriatr 2000; 12:49–65
90. Gerdner LA, Swanson EA: Effects of individualized music on confused and agitated elderly patients. Arch Psychiatr Nurs 1993; 7:284–291
91. Goddaer J, Abraham IL: Effects of relaxing music on agitation during meals among nursing home residents with severe cognitive impairment. Arch Psychiatr Nurs 1994; 8:150–158
92. Groene RW: Effectiveness of music therapy, 1: intervention with individuals having senile dementia of the Alzheimer's type. J Music Therapy 1993; 30:138–157
93. Jennings B, Vance D: The short-term effects of music therapy on different types of agitation in adults with Alzheimer's. Activities, Adaptation and Aging 2002; 26:27–33
94. Lindenmuth GF, Patel M, Chang PK: Effects of music on sleep in healthy elderly and subjects with senile dementia of the Alzheimer's type. Am J Alzheimer's Care and Related Disorders and Research 1992; 7:13–20
95. Lord TR, Garner JE: Effects of music on Alzheimer patients. Percept Mot Skills 1993; 76:451–455
96. Millard KA, Smith JM: The influence of group singing therapy on the behavior of Alzheimer's disease patients. J Music Therapy 1989; 26:58–70
97. Ragneskog H, Brane G, Karlsson I, Kihlgren M: Influence of dinner music on food intake and symptoms common in dementia. Scand J Caring Sci 1996; 10:11–17
98. Remington R: Calming music and hand massage with agitated elderly. Nurs Res 2002; 51:317–325
99. Runci S, Doyle C, Redman J: An empirical test of language-relevant interventions for dementia. Int Psychogeriatr 1999; 11: 301–311
100. Sambandham M, Schirm V: Music as a nursing intervention for residents with Alzheimer's disease in long-term care. Geriatr Nurs 1995; 16:79–83
101. Tabloski PA, McKinnon-Howe L, Remington R: Effects of calming music on the level of agitation in cognitively impaired nursing home residents. Am J Alzheimer's Care and Related Disorders and Research 1995; 10:10–15
102. Thomas DW, Heitman RJ, Alexander T: The effects of music on bathing cooperation for residents with dementia. J Music Therapy 1997; 34:246–259
103. Van Diepen E, Baillon SF, Redman J, Rooke N, Spencer DA, Prettyman R: A pilot study of the physiological and behavioural effects of Snoezelen in dementia. Br J Occupational Therapy 2002; 65:61–66
104. Baker R, Bell S, Baker E, Gibson S, Holloway J, Pearce R, Dowling Z, Thomas P, Assey J, Wareing LA: A randomized controlled trial of the effects of multi-sensory stimulation (MSS) for people with dementia. Br J Clin Psychol 2001; 40(part 1):81–96
105. Baker R, Dowling Z, Wareing LA, Dawson J, Assey J: Snoezelen: its long-term and short-term effects on older people with dementia. Br J Occupational Therapy 1997; 60:213–218
106. Spaull D, Leach C: An evaluation of the effects of sensory stimulation with people who have dementia. Behavioural & Cognitive Psychotherapy 1998; 26:77–86
107. Wareing LA, Coleman PG, Baker R: Multisensory environments and older people with dementia. Br J Therapy and Rehabilitation 1998; 5:624–629

108. Hope KW: The effects of multisensory environments on older people with dementia. J Psychiatr Ment Health Nurs 1998; 5: 377–385
109. Burgio L, Scilley K, Hardin JM, Hsu C, Yancey J: Environmental "white noise": an intervention for verbally agitated nursing home residents. J Gerontol B Psychol Sci Soc Sci 1996; 51:364–373
110. Kempenaar L, McNamara C, Creaney B: Sensory stimulation work with carers in the community. J Dementia Care 2001; 9: 16–17
111. Kim EJ, Buschmann MT: The effect of expressive physical touch on patients with dementia. Int J Nurs Stud 1999; 36:235–243
112. Robichaud L, Hebert R, Desrosiers J: Efficacy of a sensory integration program on behaviors of inpatients with dementia. Am J Occup Ther 1994; 48:355–360
113. Snyder M, Egan EC, Burns KR: Interventions for decreasing agitation behaviors in persons with dementia. J Gerontol Nurs 1995; 21:34–40
114. Young SH, Muir-Nash J, Ninos M: Managing nocturnal wandering behavior. J Gerontol Nurs 1988; 14:7–12
115. Whall AL, Black ME, Groh CJ, Yankou DJ, Kupferschmid BJ, Foster NL: The effect of natural environments upon agitation and aggression in late stage dementia patients. Am J Alzheimer Dis 1997; 12:216–220
116. Witucki J, Twibell RS: The effect of sensory stimulation activities on the psychological well being of patients with advanced Alzheimer's disease. Am J Alzheimer Dis 1997; 12:10–15
117. Camberg L, Woods P, Ooi WL, Hurley A, Volicer L, Ashley J, Odenheimer G, McIntyre K: Evaluation of simulated presence: a personalized approach to enhance well-being in persons with Alzheimer's disease. J Am Geriatr Soc 1999; 47:446–452
118. 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; 22:66–70
119. Woods P, Ashley J: Simulated presence therapy: using selected memories to manage problem behaviors in Alzheimer's disease patients. Geriatr Nurs 1995; 16:9–14
120. Peak JS, Cheston RIL: Using simulated presence therapy with people with dementia. Aging Ment Health 2002; 6:77–81
121. Hall L, Hare J: Video respite for cognitively impaired persons in nursing homes. Am J Alzheimers Dis Other Demen 1997; 12: 117–121
122. Buettner LL, Fitzsimmons S: AD-venture program: therapeutic biking for the treatment of depression in long-term care residents with dementia. Am J Alzheimers Dis Other Demen 2002; 17:121–127
123. Fitzsimmons S, Buettner LL: Therapeutic recreation interventions for need-driven dementia-compromised behaviors in community-dwelling elders. Am J Alzheimers Dis Other Demen 2002; 17:367–381
124. Ishizaki J, Meguro K, Ohe K, Kimura E, Tsuchiya E, Ishii H, Sekita Y, Yamadori A: Therapeutic psychosocial intervention for elderly subjects with very mild Alzheimer disease in a community: the Tajiri project. Alzheimer Dis Assoc Disord 2002; 16: 261–269
125. Kim NC, Kim HS, Yoo YS, Hahn SW, Yeom HA: Outcomes of day care: a pilot study on changes in cognitive function and agitated behaviors of demented elderly in Korea. Nurs Health Sci 2002; 4:3–7
126. Martichuski DK, Bell PA, Bradshaw B: Including small group activities in large special care units. Journal of Applied Gerontology 1996; 15:224–237
127. Sival RC, Vingerhoets RW, Haffmans PMJ, Jansen PAE, Ton Hazelhoff JN: Effect of a program of diverse activities on disturbed behavior in three severely demented patients. Int Psychogeriatr 1997; 9:423–430
128. Snyder M, Tseng Y, Brandt C, Croghan C, Hanson S, Constantine R, Kirby L: A glider swing intervention for people with dementia. Geriatr Nurs 2001; 22:86–90
129. Lawton MP, Van Haitsma K, Klapper J, Kleban MH, Katz IR, Corn J: A stimulation-retreat special care unit for elders with dementing illness. Int Psychogeriatr 1998; 10:379–395
130. Cleary TA, Clamon C, Price M, Shullaw G: A reduced stimulation unit: effects on patients with Alzheimer's disease and related disorders. Gerontologist 1988; 28:511–514
131. Cott CA, Dawson P, Sidani S, Wells D: The effects of a walking/talking program on communication, ambulation, and functional status in residents with Alzheimer disease. Alzheimer Dis Assoc Disord 2002; 16:81–87
132. Gorzelle GJ, Kaiser K, Camp CJ: Montessori-based training makes a difference for home health workers and their clients. Caring 2003; 22:40–42
133. Hopman-Rock M, Staats PGM, Tak ECPM, Droes R-M: The effects of a psychomotor activation programme for use in groups of cognitively impaired people in homes for the elderly. Int J Geriatr Psychiatry 1999; 14:633–642
134. Holmberg SK: Evaluation of a clinical intervention for wanderers on a geriatric nursing unit. Arch Psychiatr Nurs 1997; 11: 21–28
135. Meyer DL, Dorbacker B, O'Rourke J, Dowling J, Jacques J, Nicholas M: Effects of a "quiet week" intervention on behavior in an Alzheimer boarding home. Am J Alzheimer's Care and Related Disorders and Research 1992; 7:2–7
136. Namazi KH, Gwinnup PB, Zadorozny CA: A low intensity exercise/movement program for patients with Alzheimer's disease: the TEMP-AD protocol. J Aging Phys Act 1994; 2:80–92
137. Okawa M, Mishima K, Hishikawa Y, Hozumi S, Hori H, Takahashi K: Circadian rhythm disorders in sleep-waking and body temperature in elderly patients with dementia and their treatment. Sleep 1991; 14:478–485
138. Orsulic-Jeras S, Schneider NM, Camp CJ: Special feature: Montessori-based activities for long-term care residents with dementia. Topics in Geriatric Rehabilitation 2000; 16:78–91
139. Cohen-Mansfield J, Werner P: The effects of an enhanced environment on nursing home residents who pace. Gerontologist 1998; 38:199–208
140. Dickinson JI, McLain-Kark J, Marshall-Baker A: The effects of visual barriers on existing behavior in a dementia care unit. Gerontologist 1995; 35:127–130
141. Hanley IG: The use of signposts and active training to modify ward disorientation in elderly patients. J Behav Ther Exp Psychiatry 1981; 12:241–247
142. Hewawasam L: Floor patterns limit wandering of people with Alzheimer's. Nurs Times 1996; 92:41–44
143. Hussain RA: Modification of behaviors in dementia via stimulus manipulation. Clin Gerontol 1988; 8:37–43
144. Hussain RA, Brown DC: Use of two-dimensional grid patterns to limit hazardous ambulation in demented patients. J Gerontol 1987; 42:558–560
145. Kincaid C, Peacock JR: The effect of a wall mural on decreasing four types of door-testing behaviors. J Appl Gerontol 2003; 22: 76–88
146. Kittur SD, Ruskin P: Environmental modification for treatment of agitation in Alzheimer's patients. Neurorehabilitation 2001; 12:211–214
147. Mayer R, Darby SJ: Does a mirror deter wandering in demented older people? Int J Geriatr Psychiatry 1991; 6:607–609
148. Namazi KN, Rosner TT, Calkins MP: Visual barriers to prevent ambulatory Alzheimer's patients from exiting through an emergency door. Gerontologist 1989; 29:699–702
149. Williams R, Reeve W, Ivison D, Kavanagh D: Use of environmental manipulation and modified informal reality orientation

with institutionalized, confused elderly subjects: a replication. Age Ageing 1987; 16:315–318
150. Chafetz PK: Two-dimensional grid is ineffective against demented patients' exiting through glass doors. Psychol Aging 1990; 5:146–147
151. Annerstedt L: Group-living care: an alternative for the demented elderly. Dement Geriatr Cogn Disord 1997; 8:136–142
152. Annerstedt L: Development and consequences of group living in Sweden: a new mode of care for the demented elderly. Soc Sci Med 1993; 37:1529–1538
153. Bianchetti A, Benvenuti P, Ghisla KM, Frisoni GB, Trabucchi M: An Italian model of dementia special care unit: results of a pilot study. Alzheimer Dis Assoc Disord 1997; 11:53–56
154. Namazi KH, Johnson BD: Pertinent autonomy for residents with dementias: modification of the physical environment to enhance independence. Am J Alzheimer's Care and Related Disorders and Research 1992; 7:16–21
155. Wells Y, Jorm AF: Evaluation of a special nursing home unit for dementia sufferers: a randomised controlled comparison with community care. Aust NZ J Psychiatry 1987; 21:524–531
156. Wimo A, Adolfsson R, Sandman PO: Care for demented patients in different living conditions: effects on cognitive function, ADL-capacity and behaviour. Scand J Prim Health Care 1995; 13:205–210
157. Benson DM, Cameron D, Humbach E, Servino L, Gambert SR: Establishment and impact of a dementia unit within the nursing home. J Am Geriatr Soc 1987; 35:319–323
158. Brane G, Karlsson I, Kihlgren M, Norberg A: Integrity-promoting care of demented nursing home patients: psychological and biochemical changes. Int J Geriatr Psychiatry 1989; 4:165–172
159. Cohen-Mansfield J, Werner P, Culpepper WJ, Barkley D: Evaluation of an inservice training program on dementia and wandering. J Gerontol Nurs 1997; 23:40–47
160. Edberg A, Hallberg IR: Actions seen as demanding in patients with severe dementia during one year of intervention: a comparison with controls. Int J Nursing Stud 2001; 38:271–285
161. Hagen BF, Sayers D: When caring leaves bruises: the effects of staff education on resident aggression. J Gerontol Nurs 1995; 21:7–16
162. Matthews EA, Farrell GA, Blackmore AM: Effects of an environmental manipulation emphasizing client-centred care on agitation and sleep in dementia sufferers in a nursing home. J Adv Nurs 1996; 24:439–447
163. McCallion P, Toseland RW, Lacey D, Banks S: Educating nursing assistants to communicate more effectively with nursing home residents with dementia. Gerontologist 1999; 39:546–558
164. Schrijnemaekers V, van Rossum E, Candel M, Frederiks C, Derix M, Sielhorst H, van den Brandt P: Effects of emotion-oriented care on elderly people with cognitive impairment and behavioral problems. Int J Geriatr Psychiatry 2002; 17:926–937
165. Testad I, Aarsland AM, Aasland D: The effect of staff training on the use of restraint in dementia: a single-blind randomised controlled trial. Int J Geriatr Psychiatry 2005; 20:587–590
166. Annerstedt L, Sanada J, Gustafson L: A dynamic long-term care system for the demented elderly. Int Psychogeriatr 1996; 8: 561–574
167. Bellelli G, Frisoni GB, Bianchetti A, Boffelli S, Guerrini GB, Scotuzzi A, Ranieri P, Ritondale G, Guglielmi L, Fusari A, Raggi G, Gasparotti A, Gheza A, Nobili G, Trabucchi M: Special care units for demented patients: a multicenter study. Gerontologist 1998; 38:456–462
168. Chafetz PK: Behavioral and cognitive outcomes of SCU care. Clin Gerontol 1991; 11:19–38
169. Frisoni GB, Gozzetti A, Bignamini V, Vellas BJ, Berger AK, Bianchetti A, Rozzini R, Trabucchi M: Special care units for dementia in nursing homes: a controlled study of effectiveness. Arch Gerontol Geriatr 1998; 26(suppl 1):215–224
170. Kovach CR, Stearns SA: DSCUs: a study of behavior before and after residence. J Gerontol Nurs 1994; 20:33–41
171. Morgan DG, Stewart NJ: High versus low density special care units: impact on the behaviour of elderly residents with dementia. Can J Aging 1998; 17:143–165
172. Warren S, Janzen W, Andiel-Hett C, Liu L, McKim HR, Schalm C: Innovative dementia care: functional status over time of persons with Alzheimer disease in a residential care centre compared to special care units. Dement Geriatr Cogn Disord 2001; 12:340–347
173. Webber P, Breuer W, Lindeman D: Alzheimer's special care units vs integrated nursing homes: a comparison of resident outcomes. J Clin Geropsychol 1995; 1:189–205