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Nonpharmacologic Interventions for Inappropriate Behaviors in Dementia: A Review, Summary, and Critique

Inappropriate behaviors are very common in dementia and impose an enormous toll both emotionally and financially. Three main psychosocial theoretical models have generally been utilized to explain inappropriate behaviors in dementia: the "unmet needs" model, a behavioral/learning model, and an environmental vulnerability/reduced stress-threshold model. A literature search yielded 83 nonpharmacological intervention studies, which utilized the following categories of interventions: sensory, social contact (real or simulated), behavior therapy, staff training, structured activities, environmental interventions, medical/nursing care interventions, and combination therapies. The majority are reported to have a positive, albeit not always significant, impact. Better matching of the available interventions to patients' needs and capabilities may result in greater benefits to patients and their caregivers.

Inappropriate behaviors are very common in dementia and impose an enormous toll both emotionally and financially. These behaviors increase suffering for the person with dementia and burden for caregivers; they prompt utilization of more restrictive care, and result in the application of both pharmacologic and nonpharmacologic treatments. For the purpose of this article, inappropriate behaviors will be defined as "inappropriate verbal, vocal, or motor activity that is not judged by an outside observer to be an obvious outcome of the needs or confusion of the individual" (1). These behaviors have been labeled problem behav-iors, disruptive behaviors, disturbing behaviors, behavioral problems, and agitation, all of which are used interchangeably in this article. Inappropriate behaviors may result from depressed affect, but the term refers specifically to observable behavior, rather than internal states. Similarly, delusions and hallucinations are only included to the extent that these are manifested as inappropriate behavior; the core manifestation (i.e., the misinterpretation of reality) is not. Inappropriate behaviors have been divided into four main subtypes (2): 1) physically aggressive behaviors, such as hitting, kicking or bit-ing; 2) physically nonaggressive behaviors, such as

pacing or inappropriately handling objects; 3) verbally nonaggressive agitation, such as constant repetition of sentences or requests; and 4) verbal aggression, such as cursing or screaming. In the past, inappropriate behaviors have been handled with psychotropic drugs or physical restraints, or ignored. Research and clinical observations have questioned these practices, leading to the OBRA '87 mandate to reduce physical and chemical restraints. In response to these developments, a plethora of nonpharmacologic interventions have been initiated. However, our understanding of these interventions, their effects, and their feasibility is limited. This article addresses these issues along the following lines: the underlying assumptions and the importance of nonpharmacologic interventions; results of a literature search on the impact of nonpharmacologic interventions; and barriers to knowledge and implementation of nonpharmacologic interventions.

THE UNDERLYING ASSUMPTIONS AND THE IMPORTANCE OF NONPHARMACOLOGIC INTERVENTIONS

In order to understand the rationale for the different nonpharmacologic interventions utilized in the research literature, it is important to understand the theoretical framework they embrace in conceptualizing inappropriate behaviors in dementia. Three theoretical models have generally been applied: 1) the "unmet needs" model; 2) a behavioral/learning model; and 3) an environmental vulnerability/reduced stress-threshold model.

Unmet needs. Nonpharmacologic interventions generally aim to address the underlying needs that are causing the inappropriate behavior. As can be surmised from the definition of inappropriate behaviors, these needs are frequently not apparent to the observer or the caregiver, or else caregivers do not feel able to fulfill these needs. Significant proportions of nursing home residents who present inappropriate behaviors suffer from sensory deprivation, boredom, and loneliness. Therefore, providing sensory stimulation, activities, and social contacts are among the most commonly described interventions. A more insightful approach would be to prevent the patients from reaching the point of unmet need and to assist these persons in fulfilling their own needs. The provision of hearing aids may decrease isolation due to sensory deprivation; the provision of an easily accessible outdoor area can provide both activity and sensory stimulation.

Another type of need relates to the quality of care: reduced levels of restraints, sufficient levels of light, good toileting procedures, better communication, proper treatment of pain, etc. Some of the interventions explored, especially those related to staff training, focus on these needs.

Learning/behavioral models. The behavioral model assumes that a connection between antecedents, behavior, and reinforcement has been learned, and that a different learning experience is needed to change the relationship between antecedents and behavior (the ABC model= Antecedents→Behavior→Consequences; where antecedents operate through stimulus control, and the consequences reinforce behavior, or reinforce certain behavior related to specific antecedent stimuli). Many problem behaviors are learned through reinforcement by staff members, who provide attention when problem behavior is displayed. A modification of reinforcement contingencies is needed to change the behavior.

Environmental vulnerability/reduced stress-threshold model. Treatments of reduced stimulation levels or provision of relaxation techniques (e.g., massage) are based on the assumption that the dementia process results in greater vulnerability to the environment and a lower threshold at which stimuli affect behavior. Therefore, a stimulus that may be appropriate for a cognitively intact person may result in overreaction in the cognitively impaired person. According to the concept of progressively lowered stress threshold (3, 4), persons with dementia progressively lose their coping abilities and therefore perceive their environment as more and more stressful. At the same time, their threshold for encountering this stress decreases, resulting in anxiety and inappropriate behavior when the environmental stimuli exceed the threshold for stress. An environment of reduced stimulation is supposed to limit the stress experienced and thereby reduce the level of inappropriate behavior. Similarly, relaxation will reduce the stress and thereby decrease the manifestation of undesirable behavior.

The different models are not mutually exclusive and may be complementary. An environmental vulnerability may make the person who suffers from dementia more susceptible to environmental antecedents and consequences. The environmental vulnerability may produce an unmet need when normal levels of stimulation are perceived as overstimulation. Furthermore, different models may account for different behaviors in different people. As will be seen below, the different models provided the basis for different interventions, and in turn, the relative efficacy of these interventions may be used to indicate the usefulness of the different models.

ADVANTAGES OF NONPHARMACOLOGIC INTERVENTIONS

The reasons for using a nonpharmacologic interventions approach to treating inappropriate behaviors in dementia include the following: 1) it aims at addressing the psychosocial/environmental underlying reason for the behavior, as documented in previous research; 2) it avoids the limitations of pharmacological interventions, namely, adverse side effects, drug-drug interactions, and limited efficacy (5, 6); and 3) when medication is efficacious, it may mask the actual need by eliminating the behavior that serves as a signal for the need, thereby reducing the already-compromised communication by the elderly person and limiting the caregiver's ability to properly care for him or her.

LITERATURE SURVEY OF EFFICACY OF NONPHARMACOLOGIC INTERVENTIONS

METHODS

Literature searches were conducted on PsycLIT, MEDLINE, and a nursing subset of MEDLINE. Articles were chosen that fulfilled the following criteria: 1) published as an article in a scientific book or journal (i.e., excluding presentations, abstracts, and reports); 2) participants were at least 60 years old and suffered from dementia or cognitive impairment; and 3) a measure of the behavior or of change was obtained.

The articles were organized by type of intervention. The categorization is based on the main intervention as presented in the article, but the decision is sometimes arbitrary, such as the differentiation between sensory enhancement and activities, or between outdoor walks and physical activities, which is equivocal. A coding system was developed to describe the studies along the following dimensions: behavior, participants, setting, design, intervention, and findings.

SEARCH RESULTS

Eighty-three articles were identified that met the above criteria. The following categories of interventions were identified (number of articles for each type is listed in parentheses):

- Sensory intervention (for stimulation or relaxation), including: music (11), massage/touch (6), white noise (2), and sensory stimulation (4)
- Social contact (real or simulated), including one-on-one interaction (2), pet visits (3), and simulated presence therapy and videos (4)

- Behavior therapy, including differential reinforcement (7), cognitive (1), and stimulus control (8)
- Staff training (6)
- Activities, including structured activities (3), outdoor walks (2), and physical activities (2)
- Environmental interventions, including wandering areas (2), natural or enhanced environments (2), and reduced-stimulation environments (2)
- Medical/nursing care interventions, including light or sleep therapy (8), pain management (1), hearing aids (1), and removal of restraints (2)
- Combination therapies, including individualized (3) and group treatments (2); (See Table 1)

The largest number of articles was found in the area of sensory enhancement, especially for the provision of music for either stimulation or relaxation. Behavioral interventions had the second-highest number of papers; however, this is the only category where the majority of the articles are case studies or include only small sample sizes (see Figure 1). The vast majority of these articles were published in the 1990s, the exception being articles describing behavioral interventions that were published as early as 1978 (7). Most of the interventions fit within the framework of the unmet-needs model; the behavioral interventions generally coming from a behavioral-theoretical framework, and the reduced-stimulation environments, as well as some of the relaxing sensory interventions, originating with the reduced stress-threshold framework.

Research studies characteristics. The majority of the studies were conducted in residential facilities, primarily in nursing homes (76%, including special care units), with the rest in hospitals (24%), the community, or other types of residential arrangements. Most of the studies examined inappropriate behaviors as a whole and did not examine subtypes of behavior. The assessment methods varied across studies, with some using systematic observations, others utilizing standardized scales of caregivers' ratings or an item from such a scale, and some developing a rating assessment tool for the study. These methods yielded a great variation in what is actually measured, with some including an average of ratings of different constructs such as delusions, hallucinations, suspiciousness, violence, etc., and others concentrating on specific behaviors, such as aggressive behaviors or disruptive vocalizations. The studies also vary greatly in the time period for which the impact is examined—during the actual intervention, during the period after the intervention, or a global period that included the intervention and a time following it. The duration of treatment varied

by the type of treatment. Massage therapy was usually conducted for 5 minutes once or twice per day; listening to music frequently lasted 15 or 30 minutes. Use of hearing aids was much longer, and total environmental change encompassed a total period of weeks or longer. The design used most often was either a comparison of baseline with intervention or a comparison of baseline, intervention, and a post-intervention period. Very few studies used a control group or a control condition.

Treatment efficacy. For every major category of intervention type, most of the studies (91% of all studies) report a benefit concerning inappropriate behaviors, and some (53% of all studies) report a significant improvement from baseline to the treatment condition. For each category, there are also studies that either find no statistically significant difference, or do not use statistical analysis to examine the change from baseline to treatment, or show mixed results. The differences in intervention procedures and in methods among the studies do not allow direct comparison between their findings. A more detailed examination of the findings and their significance is included in Table 1 and in the following summary of results for each type of intervention.

The vast majority of studies did not estimate the cost of intervention. One exception is Rovner et al. (8), where the intervention rounds, which combined structured activities, psychiatric consultation, and educational activities, cost $8.94 per patient per day. However, the calculation of the cost is complex; for example, how much nursing staff time can be saved by having the activity staff occupy participants? Adjustments based on reduction in use of psychotropic medication, use of physical restraints, and reduction in the levels of drug side effects would be needed for a complete estimate.

SENSORY ENHANCEMENT/RELAXATION METHODS

Massage/Touch. Six articles report studies of massage or therapeutic touch. Usually, the procedure took about 5 minutes and was performed once or twice per day. One study reported unequivocal success (using a combination of massage and verbalizations). The other studies reported either a positive trend, partial effects (on physical and verbal behaviors) or no effect of the intervention (on aggression).

Music. Music intervention was used for two general purposes: as a relaxation during meals or bathing, or to provide sensory stimulation. The music intervention therefore ranged from listening to a music tape (in some studies, with headphones) to a music therapy session, which included musical games, dancing, movement, and singing. In using music for relaxation during bathing, two studies found that music was effective in reducing aggressive behaviors during bathing procedures and that there was a trend for decreasing other problem behaviors (9, 10). Of the three studies that examined the relaxing impact of quiet music during mealtimes, two reported a significant decline in agitation during lunchtime (11, 12), and the third did not demonstrate an effect during dinner (13). Several studies reported a reduction in verbal agitation or agitation in general while patients listened to music on a tape or a CD player (14–17). In about half of these studies, the music was individualized to match the person's preferences, whereas other studies used soft or classical music. The effect of music was reported to occur primarily during the listening sessions, and to be reduced after the conclusion of the session. Finally, music therapy, which included singing, playing instruments, and dancing, was reported to result in a significant decrease in agitation (18).

White noise. The use of white noise is believed to induce relaxation and sleep and thereby decrease nocturnal restlessness. Positive results have been reported in some, but not all, cases (19, 20).

Sensory stimulation. This refers to a combination of stimuli delivered to different sensory modalities, including hearing, touch, and smell (21). One Dutch article described the benefits of the "snoezelen" sensory stimulation. Most of the studies report improvement, although it is not necessarily statistically significant. One study showed no benefit of combining aromatherapy with massage; however, that study did not find a significant impact of each separately, either.

SOCIAL CONTACT: REAL OR SIMULATED

Pet therapy. Three studies suggest a beneficial effect of pet therapy. An intervention of 1-hour daily visits with a dog for 5 days showed a trend toward improvement ($P<0.07$) on the Irritable Behavior scale of the MOSES (Multidimensional Observation Scale for Elderly Subjects) rated for the week of treatment for 33 hospital patients on a geriatric psychiatry unit. Some, but not all, of the patients suffered from dementia (22). These results may underestimate the impact of the intervention such that a greater effect might have been seen with ratings taken immediately after treatment; ½-hour sessions with a dog resulted in significantly lower levels of agitation than ½-hour sessions with only the researcher present in 28 special-care unit residents (23). Finally, the presence of a pet at home was related to a lower prevalence of verbal aggression (24) in a study of 65 persons suffering from dementia.

Table 1. Intervention Articles

Reference	Subjects	Intervention	Findings
Sensory Enhancement/Relaxation			
I. Massage/Touch			
Kilstoff and Chenoweth (61)	*N*=16; NHR; clients of a multi-cultural daycare center in Australia	Gentle hand treatment with three essential oils for 10–15 min.	Analysis of family carers recording showed a decrease of over 20% in wandering and agitation/anxiety
Kim and Buschmann (56)	*N*=30; NHR; mean age=76.58	Hand massage of each hand for 2.5 min., with verbalization	Sig. decrease on E-BEHAVE-AD during treatment time
Rowe and Alfred (62)	*N*=14; mean age=76.77 (68–90), residing in the community	Slow-stroke massage for 5 days	Trend (NS) toward reduction of agitation (BSRS)
Scherder et al. (57)	*N*=16; mean age, 85.7 (78–92), residing in a private residence	Massage (rubbing, brushing, kneading, mostly on the back)	No sig. reduction in aggressiveness (BOP)
Snyder et al. (55)	*N*=26; AUR; age 60–97	Nurses administered hand massages to residents before care activity	Sig. decrease during the morning only
Snyder et al. (59)	*N*=18; AUR; mean age=77.7 (66–90)	Hand massage, therapeutic touch, administered for 10 days each in the afternoon; (presence used as control condition)	No effect on targeted agitated behavior; sig. effect on anxious (fidgety) behaviors for 3 of the 4- to 5-day Intervention periods (not for Presence/Control).
II. Music (during meals, bathing, general)			
Denney (11)	*N*=9; NHR; (MMSE: 0–5) mean age=74.8	"Quiet music" during lunchtime	Sig. decrease in agitation (CMAI-GA)
Goddaer and Abraham (12)	*N*=29; NHR; mean age=81.3 (67–93)	Relaxing music during lunchtime	Sig. decrease in overall agitation (CMAI-GA); no sig. difference in aggressive behaviors
Ragneskog et al. (13)	*N*=5; NHR; mean age=80 (69–94)	Music (soothing, '20s and '30s pop) played during dinnertime	No effect
Clark et al. (9)	*N*=18; NHR; mean age=82 (55–95)	Music during bathing; total of 20 bathing episodes (10 treatment; 10 control)	Sig. decrease in total number of behaviors and hitting behavior
Thomas et al. (10)	*N*=14; NHR; ages 69–86	Individualized music played before and during bathing	Sig. reduced aggressive behavior (CMAI-a) during music time
Brotons and Pickett-Cooper (18)	*N*=30 in 4 NH; mean age=82 (70–96)	Music therapy twice per week for 30 min. (singing, playing instruments, music game)	Sig. reduced agitation (DBRS) during music therapy sessions and after music therapy
Cohen-Mansfield and Werner (14)	*N*=32; NHR; mean age=87.8, 97% with dementia	1: videotape of a family member talking to elderly person 2: one-to-one social interaction with research assistant (RA) 3: individualized music tapes, 30 min.	Greatest decrease of VDB during one-to-one interaction, followed by exposure to family video, and then music

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Table 1. Intervention Articles (Continued)

Reference	Subjects	Intervention	Findings
Gerdner (63)	N=39; mean age=82 years, in a long-term care facility	Individualized music and classical "relaxation" music	Sig. decrease in agitation during individualized music (vs. classical); Sig. decrease during classical music after 20 min. of intervention
Tabloski et al. (17)	N=20; NHR; mean age=78.4 (68–74)	Listening to soft music with headphones for 15 min.	Sig. decrease in agitation (ABS) from 24.15 to a mean of 18.45 during intervention
Casby and Holm (64)	1: 87-year-old woman, verbally agitated 2: 77-year-old, verbally agitated 3: 69-year-old man, verbally agitated	A: No intervention B: Relaxing classical music C: Favorite music	Decrease in vocalizations during intervention phase
Gerdner and Swanson (16)	1: 89-year-old woman; MMSE: 0 2: 87-year-old woman; MMSE: 7; exhibiting pacing/wandering 3: 87-year-old woman; MMSE: 5 4: 94-year-old woman; MMSE: 0	Individually selected music presented on an audio cassette player	1: Trend in decrease of agitation (CMAI-a) and continued after the intervention 2: Decreased agitation on 4 out of 5 days 3: Decreased agitation 4: Decreased agitation
III. White Noise			
Burgio et al. (19)	N=13; NHR; mean age=83.08 (67–99); MMSE: 1.66; verbally agitated	"White noise" audiotapes (environmental sounds)	Sig. decrease (23%) in the 9 responders; (treatment tapes were used in only 51% of the observations)
Young et al. (20)	N=8; mean age=70 (60–82); wandering behavior in a geriatric hospital	Modified white noise (slow surf rate) at bedside	No effect overall; two patients individually analyzed showed improvement
IV. Sensory Stimulation			
Holtkamp et al. (65)	N=17; NHR	Activities in the "snoezelen" room	Decrease of behavioral problems in residents with "snoezelen" activities
Witucki and Twibell (66)	N=15; mean age=81.13 (60–95); MMSE: 0-2, in a long-term care facility	Sensory stimulation (music, touch, smell)	Sig. decrease in DS-DAT, particularly in fidgety body language, with each of the sensory stimulation types
Snyder and Olson (67)	N=5; NHR; mean age=92	Hand massage or music, each for 10 days	Trend toward decrease in aggressive behavior in each
Brooker et al. (68)	N=4; NHR; ages: 74, 77, 79, 91	Aromatherapy and/or massage for 10 sessions	Clinical staff impression of benefit to all, but observational data and comparison to control condition show benefit for 2, and sig. decrease in only 1 participant; no advantage of combining massage and aromatherapy; 2 participants manifested increased agitation during treatment
Social Contact: Real or Simulated			
I. Pets			
Churchill et al. (23)	N=28; AUR; mean age=83.3	Certified therapy dog for two 30-min. sessions	Sig. decrease in agitation (ABMI) with the dog present

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Table 1. Intervention Articles (Continued)

Reference	Subjects	Intervention	Findings
Fritz et al. (24)	N=64; mean age=74.6 (53–92), in a private residence	Companion animals	Sig. lower prevalence of verbal aggression and anxiety in pet-exposed patients
Zisselman et al. (22)	n=33, pets intervention; N=58 total; only 22% w/ dementia, in a hospital	5 days for 1 hour; pets (dog)	Trend (NS) decrease in irritable behavior (MOSES); no sig. difference between pet and exercise
II. One-to-One Interaction			
Cohen-Mansfield and Werner (41)	N=41; NHR; verbally agitated	One-on-one social interaction with research assistants (RAs)	Decrease in verbal agitation (five did not complete 10 sessions)
Runci et al. (25)	81-year-old verbally agitated woman in a long-term care facility	1: Music therapy with interaction in English 2: Music therapy with interaction in Italian	Italian interaction sig. reduced noisemaking, vs. English interaction
III. Simulated Interaction/Family Videos			
Camberg et al. (69)	N=54; mean age=82.7; MMSE: 5.1, in a long-term care facility	Simulated presence: interactive audiotape containing one side of a conversation	Sig. decrease in problem behaviors (SCMAI and observations)
Hall and Hare (70)	N=36; NHR; mean age=76.3 (65–98)	Video Respite™, 21-min.-long interactive videotape of music and reminiscence	No effect
Werner et al. (71)	N=30; NHR; verbally agitated	Family-generated videotapes, 30 min. for 10 consecutive days	46% (sig.) decrease in disruptive behaviors during videotape exposure
Woods and Ashley (72)	N=27; NHR; age 76–94	Simulated presence: telephone audio recording of caregiver	Sig. decrease of problem behavior 91% of the time
Behavior Therapy			
I. Differential Reinforcement			
Doyle et al. (73)	N=12 verbally agitated Ss in a long-term care facility	Reinforcement of quiet behavior and environmental stimulation based on individual preferences	Decrease in noise-making (CMAI) in 3 cases; 4 cases w/ no effect (7 of 12 completed study)
Heard and Watson (74)	N=4; NHR; age 79–83; exhibiting wandering	Differential reinforcement=tangible reinforcers (food) Extinction=attention given in the absence of the behavior	Decrease in wandering (from 50% to 80% reduction)
Mishara (7)	N=80; mean age=68.8 (±SD 5.1) in a chronic geriatric mental hospital	Token economy: rewards (tokens) for desirable behavior, could then be exchanged for secondary reinforcers General milieu: all secondary reinforcers were available for anyone who wanted them; activities were offered for participation but not rewarded	Sig. decreased behavior in general milieu; trend (NS) decrease in token economy

Table 1. Intervention Articles (Continued)

Reference	Subjects	Intervention	Findings
Rogers et al. (75)	*N*=84; NHR; mean age=82; mean MMSE: 6.07	Skill elicitation: identify and elicit retained ADL skills; habit training: reinforce and solidify skills	Sig. decrease in disruptive behavior
Birchmore and Clague (76)	70-year-old female NHR; verbally agitated	Stroking back as reward for quiet behavior	Decrease in vocalizations
Boehm et al. (77)	1: 87-year-old woman 2: 55-year-old man	Behavioral plan that prompted calm, cooperative behavior by reinforcing (food, toys, and praise) for each small step toward the desired behavior	1: Decrease of disruptive behavior during bathing 2: Nearly eliminated disruptive behavior during shaving and bathing
Lewin and Lundervold (78)	1: 73-year-old woman, verbally aggressive, in a foster home 2: 76-year-old AU NHR; physically aggressive woman, in a foster home	1: Communication/problem-solving strategy and provider keeping record of subject's yelling episodes 2: Implementation of a new routine incompatible with aggression (e.g., supporting herself by holding towel bar)	1: Yelling behavior stopped, even at 1 month follow-up 2: Sig. decrease in aggressive behavior, but variable
II. Stimulus Control			
Chafetz (79)	*N*=30; AUR; mean age=81; exit-seeking	Placement of two-dimensional grid in front of glass exit doors	No effect
Hussian (80)	*N*=5; mean age=71.2; inappropriate toileting, bed misidentification, exit-seeking in a long-term care facility	B1: Verbal and /or physical prompts were given to attend to enhancing stimuli (yellow restroom doors) B2: stimulus-enhancement alone	Sig. decrease of problem behavior for each resident
Hussian and Brown (81)	*N*=8; mean age=78.5; hazardous ambulation in a public mental hospital	Various two-dimensional grid patterns placed on floor in front of exit door	Sig. decrease of hazardous ambulation; horizontal superior to vertical configuration
Mayer and Darby (82)	*N*=9; mean age=77.8; MMSE: ≤12; exhibiting wandering behavior in a psychiatric ward	Mirrors in front of exit doors to prevent exiting	Sig. decrease in successful exiting
Bird et al. (83)	1: 73-year-old woman 2: 62-year-old man with frequent visits to bathroom, residing in a private home 3: 83-year-old woman in a hostel w/anxiety about medication 4: 88-year-old woman, verbally aggressive 5: 83-year-old man; MMSE: 9; urination in corners, residing in a private home	1: Stimulus control (taught to associate stop sign with stopping and walking away) 2: Stimulus control (beeper signal associated with toileting demand) 3: Spaced retrieval with fading cues 4: Spaced retrieval and fading cues 5: Spaced retrieval; taught to associate cue with location of toilet	1: Decrease in inappropriate entries (mean of 43.6 to 2) 2: Decrease in anxiety while wearing beeper, but retained fear of soiling himself 3: Decrease in verbal demands for medication 4: No effect 5: Decrease in inappropriate toileting, although prompting needed at night
Hussian (84)	*N*=3; mean age=73.4; pacing/wandering in a long-term care facility	First, stimuli (orange arrows, blue circles) were linked to positive and negative consequences (food, loud noise); then, stimuli were placed in areas where participants were encouraged or discouraged to walk, respectively	Decrease of entries into potentially hazardous areas

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Table 1. Intervention Articles (Continued)

Reference	Subjects	Intervention	Findings
(Study 2)	*N*= 3; mean age=74.67; in a long-term care facility	Trained to respond to two stimuli differently; attention to desirable stimulus resulted in reinforcement	Differential reinforcement with stimulus control resulted in reduction of behavior
(Study 3)	64-year-old male NHR; genital exposure and masturbation in lounge areas	1=rules; 2=differential reinforcement; 3=2+ antecedent enhancement	Decrease in inappropriate behavior in public area and continued at follow-up
III. Cognitive			
Hanley et al. (26)	*N*=57, in a psychogeriatric hospital and home for elderly	Reality-orientation (RO): cognitive retraining where orientation information is rehearsed	No effect with RO class (GRS)
Staff Training			
Cohen-Mansfield et al. (33)	All NHR in the participating units	In-service training for nursing staff	No effect
Matteson et al. (32)	Original sample: *n*=63, in a VA nursing home, for treatment group; *N*=30, in a community nursing home, for control; mean age=77; mean MMSE: 12.5; Completers: 43 Treatment, 14 Control	Staff training based on adapting ADL activities to resident's level on Piaget's stages; also, environmental modification included cues of colors, symbols, pictures, music, etc.; psychotropic drug withdrawal was also undertaken	No sig. decrease from pre-test to 3 mo., but sig. decreases to 12 and 18 months post-test (NHBPS) for treatment group; control group decreased at 3 and 12 months, but increased to pre-test level at 18 months
McCallion et al. (30)	*N*=105; NHR	Nursing Aides Communication Skills Program (NACSP)	Sig. reduction in agitated behavior (MOSES and CMAI) for at least 3 months
Mentes and Ferrario (28)	*N*=8; NHR; physically aggressive	Calming Aggressive Reactions in the Elderly (C.A.R.E.): education program for nurse aides	Decrease in agitation from 11 to 9 incidents of staff abuse after the intervention
Wells et al. (31)	*N*=40; NHR	Educational program on delivering activities; focused monitoring care	Decreased level of agitation (MIBM and PAS)
Williams et al. (29)	*N*=2; residents of VA special-care unit responsible for many staff injuries	Staff training in small groups, including empathy training, theory training, and skill training	Sig. decrease, from 0.19 to 0.04 incidents per day, according to patient record review
Structured Activities			
I. Structured Activities			
Aronstein et al. (34)	*N*=15; NHR; mean age=81 (68–94)	Recreational interventions (manipulatives, nurturing, sorting, sewing, and music)	Decrease in agitation (CMAI) 57% of the time
Groene (53)	*N*=30; mean age=77.5 (60–91); pacing/wandering in an Alzheimer unit	Mostly music (playing instruments, singing, dancing) or mostly reading for 7 days	Decreased wandering in music sessions vs. reading sessions
Sival et al. (35)	1: 76-year-old, verbally aggressive woman 2: 82-year-old, physically agitated woman 3: 81-year-old man All in private residences	Activities program outside their units (musical activities, social activities, games, creative works, singing)	Inconclusive (SDAS-9)

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Table 1. Intervention Articles (Continued)

Reference	Subjects	Intervention	Findings
II. Outdoor Walks			
Cohen-Mansfield and Werner (37)	*N*=12; NHR	Escorting residents to an outdoor garden (one-to-one supervision)	Sig. decrease in physically aggressive and nonaggressive behaviors (CMAI)
Holmberg (85)	*N*=11; NHR; wandering and physically aggressive agitation	Group walk through common areas or outside, singing and holding hands	Sig. decrease in agitation on group days vs. non-group days
III. Physical Activities			
Buettner et al. (54)	*N*=36; NHR; mean age: 82.4; MMSE: 6.5	Sensorimotor program to improve strength and flexibility vs. a traditional program	Decreased agitation during the sensorimotor vs. the traditional program
Zisselman et al. (22)	*n*=25 in exercise group; *N*=58 total in a hospital; only 22% had dementia	Exercise 5 days for 1 hour	NS trend of decrease in agitation (MOSES)
Environmental Interventions			
I. Wandering Areas			
McMinn and Hinton (38)	*N*=13 participants in a psychiatric facility	Released from mandatory confinement indoors	Decrease in verbal and physical aggression, especially among men
Namazi and Johnson (39)	*N*=22; AUR; mean age=80 (69–98)	Unlocking exit door to outside walking paths	Decrease in agitated behaviors (CMAI and DBDS) when door was unlocked
II. Natural/Enhanced Environments			
Cohen-Mansfield and Werner (41)	*N*=27; NHR; mean age=84.4 (75–93)	Enhanced environment (corridors decorated to depict nature and/or family environment)	Decrease in most types of agitation (CMAI) vs. No Scenes
Whall et al. (40)	*N*=31 in five NH	Natural environment (e.g., bird sounds, pictures, food) during bathing	Sig. decrease from baseline to T_1 and T_2 and in treatment group vs. control (CMAI-W)
III. Reduced Stimulation			
Cleary et al. (86)	*N*=11; NHR; mean age=87.2 (81–94)	Reduced Stimulation Unit	Decrease in agitation from 1.7 to 0.8 (4-point scale)
Meyer et al. (42)	*N*=11, residing in an Alzheimer's boarding home	Quiet Week, including no TV/radio; staff used quiet voices and reduced fast movements	Sig. decrease in non-calm behaviors
Medical/Nursing Care Interventions			
I. Light Therapy/Sleep			
Koss and Gilmore (44)	*N*=18; NHR	Increased light intensity during dinnertime	Sig. decrease in agitated behaviors
Lovell et al. (87)	*N*=6; NHR; mean age=89.2	Bright light (2,500 Lx) in the morning for 10 days	Sig. decrease in agitation (ABRS)
Lyketsos et al. (88)	*N*=15, in a chronic care facility	Bright-light therapy	No effect (BEHAVE-AD) vs. a control group

INFLUENTIAL PUBLICATIONS

Table 1. Intervention Articles (Continued)

Reference	Subjects	Interventions	Findings
Mishima et al. (89)	N=24; mean age=75 in an acute-care hospital	Morning-light therapy	Sig. decrease in problem behaviors from an average of 23.9 to 11.6; also, an increase in nocturnal sleep
Okawa et al. (90)	N=24; mean age=76.6; n=8 (controls), in a geriatric ward w/sleep-wake disorders	Phototherapy with illumination of 3,000 lux in the morning	Effective for sleep-wake rhythm disorder in 50%; behavioral disorders decreased
Satlin et al. (91)	N=10; mean age=70.1, in a VA hospital, with sundowning (MMSE: 0.6)	2-hour exposure to light (1,500–2,000 lux) while seated in a geri-chair	No effect on agitation, but a decline in severity of sundowning and sleep-wake problem patterns
Thorpe et al. (92)	N=16; ages 60–89 in a long-term care facility	Light administered using the Day-Light Box 1,000	Trend to decreased agitation (CMAI and EBIC) vs. baseline in posttreatment week
Alessi et al. (45)	N=29; NHR; mean age=88.3	Increased daytime activities and a nighttime program to reduce sleep-disruptive noise	22% decrease in agitation vs. baseline (sig. difference from control group); increase in nighttime sleep from 51.7% to 62.5% vs. controls
II. Pain Management			
Douzjian et al. (48)	N=8; long-term residents of skilled nursing facility; >70 years old	650 mg acetaminophen t.i.d.	Five residents (63%) showed decrease in behavior measured; four orders for antipsychotic drugs and one for antidepressant drugs successfully discontinued
III. Hearing Aids			
Palmer et al. (48)	N=8; 5 men, 3 women, ages 71–89; MMSE: 5–18; community-dwelling	Hearing aids provided	Decrease in problem behavior as reported by caregiver
IV. Removal of Restraints			
Middleton et al. (93)	N=4; age 69–82, in a long-term care facility	Pain management, restraint management, and beta-blockers	Decrease in the amount and intensity of aggressive behaviors (OAS)
Werner et al. (46)	N=172; NHR, no Restraints: n=30; mean age: 86.9; Restrained: n=142; mean age: 86.1	Educational program for nursing staff, then removal of restraints	Sig. decrease in all types of agitation (SCMAI; only those exhibiting agitation while restrained included for analysis)
Combination Therapies			
I. Individualized Treatments			
Hinchliffe et al. (94)	N=40; mean age=81 (65–93); MMSE≥8 in the community	Individualized treatments: combination of pharmacologic and non-pharmacological interventions (activities, if understimulated)	Sig. decrease in problem behaviors in first treatment group, but not in the delayed-treatment condition
Holm et al. (95)	N=250; mean age=81 (SD=8) in an acute-care hospital	Individualized inpatient program plan; pharmacologic and nonpharmacologic	Sig. decrease in agitation (RAGE); problem behaviors eliminated in 38% of patients
Matthews et al. (96)	N=33; mean age=84.2 (67–98) in a dementia unit	Client-oriented care, residents' wishes respected; scheduled events adjusted for individual residents	Sig. decrease in verbal agitation (CMAI) 6–8 weeks after the change

(continued)

Table 1. Intervention Articles (Continued)

Reference	Subjects	Interventions	Findings
II. Intervention Programs			
Rovner et al. (8)	N=81; NHR; mean age=81.6	Activity program (music, exercise crafts, relaxation, reminiscences, word games), reevaluation of psychotropic medication, and educational rounds	Sig. decrease in agitation vs. control group (at 6 months, behavior disorder exhibited by 28.6% vs. 51.3%)
Wimo et al. (97)	N=31; median age=82 (62–96), residing in a psychogeriatric ward	Program developed including team care, enhanced environment, flexibility in daily routine, evaluations	No effect on irritability; worsening in restlessness vs. controls

Note: NS=not statistically significant; sig.=statistically significant; SD=standard deviation; S=subject; NHR=nursing home residents; AUR=Alzheimer disease unit residents; NH=nursing home; VDB=verbally disruptive behavior; ABMI=Agitation Behavior Mapping Instrument (1); ABRS=Agitation Behavior Rating Scale (98); ABS=Agitated Behavior Scale (99); BOP=Beoordelingsschaal Voor Oudere Patienten (100); BSRS=Brief Behavior Symptom Rating Scale (101); CMAI=Cohen-Mansfield Agitation Inventory (102); CMAI-a=Adaptation of Cohen-Mansfield Agitation Inventory (103); CMAI-GA Cohen-Mansfield Agitation Inventory (102), as modified by Goddaer and Abraham (12); CMAI-W=Cohen-Mansfield Agitation Inventory (102), as modified by Chrisman et al. (104); DBDS=Dementia Behavior Disturbance Scale (105); DBRS=Disruptive Behavior Rating Scales (106); DS-DAT=Discomfort Scale for Dementia of the Alzheimer's Type (107); E-BEHAVE-AD adaptation by Auer et al. (108) of the Behavioral Pathology in Alzheimer's Disease Rating Scale (BEHAVE-AD) (109); EBIC=Environment Behavior Interaction Code (110); GRS=Geriatric Rating Scale (111); MIBM=Modified Interaction Behaviour Measure (112); MOSES=Multidimensional Observation Scale for Elderly Subjects (113); NHBPS=Nursing Home Behavior Problem Scale (114); OAS=Overt Aggression Scale (115); PAS=Pittsburgh Agitation Scale (116); PGDRS=Psychogeriatric Dependency Rating Scale (117); RAGE=Rating Scale for Aggressive Behavior in the Elderly (118); SCMAI=Short Form of the Cohen-Mansfield Agitation Inventory (119); SDAS-9=Social Dysfunction and Aggression Scale (120).

One-on-one interaction. We found (14) that one-on-one interaction for ½ hour per day for 10 days was effective in decreasing verbally disruptive behaviors by 54%, a reduction that was significantly larger than the control condition of the same duration in 41 nursing home residents. The importance of interaction was also demonstrated by the Runci et al. (25) finding that interaction in Italian was superior to interaction in English when each was combined with music therapy to reduce vocal agitation in an 81-year-old Italian woman suffering from dementia.

Simulated interaction. Two studies report a significant positive impact of Simulated Presence Therapy, an audiotape that contains a relative's portion of a telephone conversation, and leaves pauses that allow the older person to respond to the relative's questions. A different type of simulated social contact, videotapes of family members talking to nursing home residents, was reported to result in an average decrease of 46% in verbally disruptive behavior during exposure to the videotape. In contrast, a generic videotape of reminiscence and relaxation did not result in reduction in agitation. (See Table 1.)
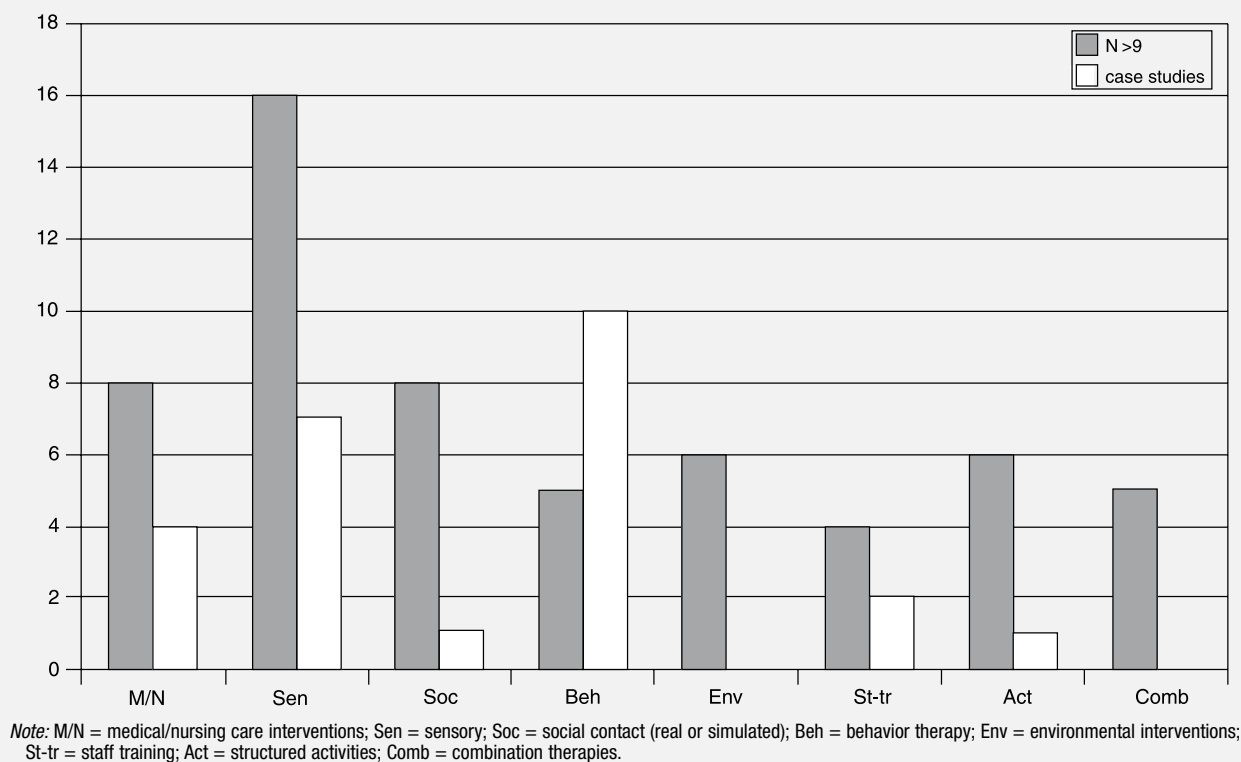
BEHAVIORAL INTERVENTIONS

Most articles presenting behavioral techniques are case reports. The methods used include extinction (i.e., withholding of positive reinforcement during inappropriate behavior), differential reinforcement (i.e., reinforcing either quiet behavior or behavior that is incompatible with the inappropriate behavior, or successive approximations to desired behavior), and stimulus control (teaching an association between a stimulus/cue and behavior). Reinforcements include social reinforcement, food, touch, going outside, etc. The majority of the studies reported a reduction in problem behavior. However, some of the studies reported no effect (26), and others required an additional procedure (instruction in positive statements in addition to extinction) to produce an effect (27). One behavioral study actually supports the provision of stimulation or environmental enhancement (noncontingent reinforcement) over the use of contingent reinforcement (7).

STAFF TRAINING

Most staff training programs focus on understanding inappropriate behaviors, improving verbal and nonverbal communications with persons suffering from dementia, and improving methods of addressing their needs. Findings suggest that repeated ongoing training is needed to affect staff behavior. The CARE program (Calming Aggressive Reactions in the Elderly) (28) involved six staff-training sessions that emphasized risk factors for aggression, preventive and calming techniques, and protective intervention. Sessions utilized video-

Figure 1. Number of Articles by Types of Intervention and Number of Participants (Case Studies Defined as Studies With ≤ 9 participants)

Note: M/N = medical/nursing care interventions; Sen = sensory; Soc = social contact (real or simulated); Beh = behavior therapy; Env = environmental interventions; St-tr = staff training; Act = structured activities; Comb = combination therapies.

taped vignettes, discussions, and role-play, and they emphasized nonverbal communications. The authors reported a decline from 11 to 9 incident reports of staff abuse over the 3-month period of the intervention (29). The NACSP (Nursing Assistant Communication Skill Program) (30) included five group-training sessions and four individual conferences with nursing assistants. The program emphasized enhancing residents' ability to use sensory input, effective and ineffective communication styles, utilization of memory aids, and addressing residents' needs. The program resulted in a significant decrease in verbal agitation and in physically nonaggressive behaviors at the end of 3 months, relative to a control group. Results were less compelling at 6 months, suggesting that additional ongoing training may be needed. Another training program, an abilities-focused program of morning care (31), included a five-session educational program about the impact of dementia on social and self-care abilities, methods of assessing abilities, and interventions to maintain or compensate for those abilities. Agitation was significantly decreased after intervention from baseline in comparison with the same timeframe-related changes in a control group. An emphasis on Activities of Daily

Living (ADLs) is also a major focus in Matteson et al.'s (32) program of staff training, emphasizing adaptation of ADLs to the person's level of functioning, based on Piaget's stages. Finally, a one-session training program on understanding and treating physically nonaggressive behaviors yielded no improvement in staff or resident behavior (33).

STRUCTURED ACTIVITIES

Surprisingly, relatively little research was found concerning the impact of structured activities per se (though some combination therapies and music therapy include structured activities). A positive impact of activities is reported by Aronstein et al. (34), who presented 15 nursing home residents with recreational interventions, including: manipulative (e.g., bead maze), nurturing (e.g., doll), sorting (e.g., puzzles), tactile (e.g., fabric book), sewing (lacing cards), and sound/music (e.g., melody bells). Fourteen episodes of agitation were observed in five residents, and the interventions were judged as helpful in alleviating agitation in 57% of these episodes. Another study of group activities that was provided to three patients (35) yielded inconclusive results.

Outdoor walks. Two studies used outdoor walks

for wanderers, and both found that this intervention led to decreases in inappropriate behavior (36, 37). Both studies involved interpersonal contact during the walk, though that was more pronounced in Holmberg's (36) study, which also included singing and holding hands.

ENVIRONMENTAL DESIGN

Access to an outdoor area. Two studies showed that free access to an outdoor area result in decreased agitation (38, 39). When the person has control over the ability to go outdoors, that control is expected to be of additional therapeutic benefit beyond that of the outdoor walk experience.

Natural environments. A natural environment, consisting of recorded songs of birds, babbling brooks, or small animals, together with large, bright pictures matching the audiotapes and offering of foods such as pudding, were presented during shower time. This resulted in significant reductions in agitation in the treatment group of 15 nursing home residents, in comparison with the control group of 16 residents who received usual care (40). A simulated home environment and a nature environment, each composed of visual, auditory, and olfactory stimuli, were compared in a study of nursing home residents who wander. Results showed a trend toward less trespassing, exit-seeking, and other agitated behaviors in the altered environments, as compared with the unit's usual decor (41).

Reduced-stimulation units. Two articles describe a reduction in agitation after the initiation of a reducedstimulation environment. The first study involved camouflaged doors; small tables for eating; small-group activities; neutral colors on pictures and walls; no televisions, radios, or telephones (except one for emergencies); a consistent daily routine; and an educational program for staff and visitors concerning use of touch, eye contact, slow and soft speech, and allowing residents to make choices. As a result, both agitation and use of restraints declined (no statistical test is presented for agitation). The second study (42) included elimination of television/radio/stereo or piano-playing; use of quiet voices by staff at all times; relocation of the public entrance to an area that was out of sight of the residents; and reduced use of telephone. Observation of 11 residents before and after the changes showed a statistically significant decrease in agitated behaviors.

MEDICAL/NURSING INTERVENTIONS

Bright-light therapy and sleep interventions. Bright-light therapy has been used to improve sleep and reduce agitation, which can result from fatigue or circadian rhythm disturbances. The results of the seven studies using light therapy for this purpose are inconclusive in that some report no effect, some report a significant decrease, and some report a trend (see Table 1). These differences may stem from differences in design and measurement or from differences in population. For example, Van Someren et al. (43) noted that the impact of bright-light therapy was evident in persons with intact vision but not in those who were significantly visually impaired. Light has also been used differently in a study by Koss and Gilmore (44), who reported that increased light intensity and enhanced visual contrast (achieved by the colors of tablecloths, napkins, etc.) during evening meals resulted in a significant increase of food intake and a significant decrease in agitation during the intervention periods, compared with pre-intervention and post-intervention periods.

Increasing sleep to reduce agitation without use of bright light was the approach taken by Alessi et al. (45). They found that increased daytime physical activity, decreased nighttime noise, and decreased sleep disruptions by nursing care staff resulted in a decrease in inappropriate behaviors during the day.

Restraint removal. Two uncontrolled, small studies suggest that removal of physical restraints reduced inappropriate behaviors (46, 47); the article by Middleton et al. (47) also described another resident for whom pain management resulted in a decrease in aggression.

Pain management. A trial of pain medication for eight nursing home residents with difficult behaviors showed that behavioral symptoms decreased, and psychotropic medication was successfully discontinued in 63% (48).

Hearing aids. Addressing the hearing impairment of eight community-dwelling persons suffering from dementia by fitting them with hearing aids resulted in a significant decrease in inappropriate behaviors (49). Similarly, a case study that does not have a specific measurement of behavior reports a decrease in yelling behavior with the introduction of an amplification device (50).

COMBINATION INTERVENTIONS

Combination interventions usually combine pharmacological and nonpharmacological treatments, as well as structured activities and nursing care interventions (e.g., reduction in physical restraints). Some of those have used an individualized approach, where a treatment plan is fitted for each participant on the basis of his or her previous treatment, abilities, and type of problem behaviors; others have used a general group-treatment approach. Most, but not all, of the combination

approaches report significant improvement of behavior with the program, although one of the studies reported worsening.

In addition to providing information concerning the impact of specific interventions, the literature examines the issues of the usefulness of individualization of treatments and of comparison across treatments.

INDIVIDUALIZATION OF TREATMENT

The best support for the notion that intervention needs to be individualized to the person's past preferences comes from a study conducted by Gerdner (15). She found that music based on participants' past preferences had a greater beneficial impact on behavior than non-individualized music. Several other studies have addressed the issue of individualization. In a study comparing different interventions, Cohen-Mansfield et al. (33) found that persons manifesting different types of verbally disruptive behaviors tended to benefit more from different interventions. For example, those with hallucinations benefited more from the videotape of family members talking to them, whereas those who were requesting attention benefited most from the one-on-one social interaction. Several articles describe individualized approaches to treating behavioral problems (51–53).

The delineation of the parameters to be addressed in individualization may be assisted by a model of examining the heterogeneity in dementia (52). This model describes inter-person differences as stemming from variation in the domains of biological/medical, psychosocial, and environmental, each of which is examined across the time-points of initial predisposition, lifelong influences, and current conditions. This framework may be useful in classifying the issues that need to be taken into account in the individualization of treatment. Obviously, issues of cognitive level, sensory deficits, mobility, social abilities, and environmental resources all have an effect on the tailoring of a specific nonpharmacologic treatment for a given behavior.

COMPARISON ACROSS TREATMENTS

Whereas a valid comparison of treatments used in different studies is currently impossible because of the heterogeneity in methods and treatment applications across studies, several studies used specific comparisons within each study that can help clarify the principles needed for maximizing the impact of intervention. A comparison of sensory stimulation (individualized music tape) to simulated social contact (videotape of family member) to actual social contact (one-on-one interaction) revealed that actual social contact had the highest impact in reducing verbal/vocal inappropriate behaviors (14). Another study, of 30 Alzheimer-unit residents who wandered, found that music therapy activities (listening, playing percussion instruments, singing, and movement or dance) promoted more seating behavior than reading aloud to the resident. Both types of intervention were conducted in one-on-one sessions with the therapist, and, whenever possible, the content of the session was individualized to match the resident's past preferences (54). Another study (55) compared two complex treatment modules: a traditional activity program, which included sensory stimulation, sewing club, ceramics group, adapted bingo, chair exercise, arts and crafts, sing-a-longs, etc., with the Neuro-Developmental Sequencing Program (NDSP), which included sensory air-mat therapy, sensory stimulation box program, geriexercise to music, sensory cooking groups, build-your-own games, special-event preparation program, and sensory special events. In a crossover design controlling for order effects, of 32 nursing home residents, the NDSP group showed significant decreases in agitation as well as improvement in grip-strength. These studies present a first step and highlight the necessity for additional research that compares interventions and their "fit" with individual needs.

DISCUSSION

THE NATURE OF THE INTERVENTIONS: THE INTERCONNECTIONS BETWEEN DOMAINS OF FUNCTIONING

Nonpharmacologic interventions address a wide range of underlying problems: hearing problems, sleep difficulties (light therapy), communication problems, inactivity, and loneliness. These difficulties in life experience are closely interlinked among themselves. The approach to reducing inappropriate behavior in dementia is therefore identical to addressing those difficulties and improving quality of life for this population. As such, these interventions may provide an initial guide to a needed reform in the care of persons with dementia. The required care would better address their needs and thereby decrease rates of inappropriate behaviors.

The research reviewed shows that despite the many difficulties (described below) of conducting research in this population, a wide variety of approaches have been tried successfully. Many nonpharmacological approaches resulted in a statistically and clinically meaningful improvement

in the manifestation of behavior problems. Even when no statistical results are presented, the combination of several studies showing the same trend lends support to the approaches described. Furthermore, many nonpharmacologic interventions result in an improvement in the quality of life of the older person, above and beyond the benefit shown in reduction of inappropriate behavior. Nonpharmacologic interventions, therefore, essentially address improvements in quality of care and the ensuing quality of life.

The principles listed below, which received consistent support in the research described here, should be considered primary targets for future nonpharmacologic interventions:

- Medical and nursing care that effectively address limitations in functioning, including pain, sensory limitations, sleep problems, and limitations on autonomy, such as physical restraints
- Provision of social contact
- Provision of meaningful stimuli or activity
- Tailoring the intervention to the individual
- Staff training to improve care
- Reduction in stressful stimuli or increasing relaxation during care activities

THE RELATIONSHIP BETWEEN PHARMACOLOGIC AND NONPHARMACOLOGIC INTERVENTIONS

This relationship has not been addressed in the literature. Many of the nonpharmacologic intervention studies include participants who are already receiving psychotropic medication that has not alleviated the problem. For some of these, the pharmacologic treatment was kept constant during the interventions, and in others the researcher had no control over the medications the participants were taking.

The comparison of pharmacologic and nonpharmacologic studies that are independently conducted is difficult. Many of the pharmacologic studies investigate new drugs for FDA approval, utilizing a double-blind, placebo-controlled design, which is not feasible in nonpharmacologic studies. In our experience, these pharmacologic studies have different inclusion criteria, so that many more of the frail patients and those with extreme dementia are excluded from these studies, in comparison with nonpharmacologic studies. The placebo condition in pharmacologic studies frequently has a significant impact in reducing inappropriate behaviors. Whereas such an outcome could be attributed to a Hawthorne effect and observer bias, the large size of the effect, compared with the inability of many of

the studies reviewed here to achieve a significant effect, prompts me to interpret this effect as a result of one-on-one interaction, which is a potent and expensive nonpharmacologic intervention. Finally, pharmacologic studies are performed within the framework of the FDA guidelines of "burden of proof," which are different from what is needed to convince the caregiver audience of the efficacy of nonpharmacologic interventions.

The comparison of pharmacologic with nonpharmacologic interventions and the role these should and could play goes beyond the scope of this article and deserves a public debate. In our opinion, the nonpharmacologic interventions described in this article generally address the basic needs of the person with dementia and provide humane care—and therefore should precede pharmacologic interventions.

LIMITATIONS OF EXISTING KNOWLEDGE

Despite a substantial number of articles describing the impact of nonpharmacologic interventions for persons with dementia, the understanding of the efficacy of these interventions is quite limited. Many questions remain unanswered, such as: What is the size of the effect? What percent of participants show improvement? How consistent is the effect over time? Many of the articles provide only partial answers, at best. The ambiguity in the understanding of efficacy in the studies is due to multiple limitations, some of which are methodological and others, conceptual.

Methodological issues limiting the understanding of efficacy: diverse measurement methods. Different studies utilize various measurements, including standardized informant ratings (see footnote to Table 1), systematic observations, and other informant ratings developed specifically for the study. Different instruments target different behaviors and different attributes of the behaviors, such as occurrence, frequency, or severity. Similarly, there is variation in the time-frame in which the impact of intervention is measured. Frequently, data are attained during the intervention, sometimes immediately after the intervention, and, on other occasions, during the period around the intervention (e.g., the day or week in which the intervention took place).

Criteria for success. The method by which results are reported varies greatly, so that some researchers report an improvement when any of the participants manifest any improvement, whereas others require statistical significance or a clinically meaningful improvement, as well as statistical significance. Even when results are reported in detail,

they sometimes represent partial success, which is difficult to interpret. For example, in a well-designed study by Snyder et al. (56), a significant effect of hand massage on the main agitated behavior was found in the morning; however, there was no effect on the second agitated behavior, nor was there an effect when the intervention was carried out in the evening. The efficacy of the intervention therefore remains ambiguous. When success of the intervention is established, the magnitude of the effect may vary, depending on other variables, such as the duration of the intervention (57).

Screening procedures. When calculating the percentage of persons who benefited from treatment, the criteria for determining eligible study participants vary across studies. Some studies utilize screening procedures that test the feasibility of conducting the intervention prior to implementation (19), and, in these cases, the treatment-effect size reported is therefore larger than if all those eligible for treatment were considered. Screening criteria often vary among studies and may exclude a variety of medical disorders. For instance, Scherder et al. (58) excluded persons with a history of psychiatric disorder, alcoholism, cerebral trauma, cerebrovascular disease, hydrocephalus, neoplasm, infection, epilepsy, kidney or lung diseases, disturbances of consciousness, or focal brain abnormalities, which would be expected to affect the generalizability of results. Other studies screened out those who did not attend treatment sessions (18). Screening may be essential to the treatment procedures, as in the case of selecting participants who do not have severe hearing impairment for music therapy.

Control procedures. Many (about half) of the studies examine change from baseline to intervention, and do not use any control procedures. Therefore, in these studies, it is difficult to determine whether the effect is that of the intervention, the passage of time, or changes that tend to occur in the population studied. It can be argued that when participants are chosen because of significant levels of inappropriate behavior, their behavior may improve over time simply by "regression towards the mean," or, in other words, because the initial screening caught them at the time at which they were most agitated. On the other hand, the institution of a control group or a control condition is not always feasible for ethical or financial reasons; for example, not providing hearing aids or not reducing physical restraints, or alternatively, removing hearing aids that had been provided or re-instituting physical restraints would all be questionable practices. The optimal utilization of control procedures is also a matter of debate. The great heterogeneity among dementia sufferers would dictate a within-person

control condition; however, given that these persons are in a state of decline regardless of intervention procedures, it can be argued that a parallel-group control is needed to control for that impact.

Treatment of failures. The incidence of treatment failures is greatly underreported. Reports of treatment failures tend not to be submitted or accepted for publication. Therefore, the results of such studies would not be available to the public. This is especially true of case studies. We chose to include case studies despite this limitation because some studies are extremely difficult to conduct, and case studies may offer the only opportunity to examine innovative ideas for intervention. Even when studies use larger sample sizes, the issue of failures may be neglected by describing only the successes and not examining the possibility of worsening behavior.

THE RELATIONSHIP BETWEEN TARGET SYMPTOM AND TYPE OF INTERVENTION

The vast majority of studies reviewed used a group of inappropriate behaviors as the dependent variable. There was usually no attempt to analyze the impact of the intervention on specific types of inappropriate behaviors.

The lack of differentiation of the target symptom is a problem for two reasons. First, there is evidence that the etiology of the different subtypes of behavior tends to be different, and it therefore stands to reason that certain interventions would be appropriate for some types of behavior and not for others. Second, the goal of intervention for aggressive and verbally agitated behaviors is generally to reduce this occurrence, whereas for physical nonaggressive behaviors, which provide exercise and stimulation for the residents, the goal is frequently to accommodate the behavior or to channel it into avenues that do not disturb others. For example, the study outcome may not be a decrease in the rate of walking, but rather a change in location, decreased trespassing, or decreased disturbance to other residents or caregivers. Indeed, the focus of several articles on wanderers was to enhance the well-being of wanderers, rather than decrease their wandering behaviors (37, 59).

INTRINSIC AND CONCEPTUAL ISSUES LIMITING THE UNDERSTANDING OF EFFICACY

Variation of treatment parameters. Each type of nonpharmacologic intervention applies one instance of the infinite variations possible for that type of intervention. Variation can occur in duration, timing, level (e.g., brightness of light), or size (e.g., objects to be manipulated), to name a few.

Treatment failure or success may depend on these specifics, rather than on the inherent applicability of the genre of intervention. For example, one critique of a bright-light therapy study, which resulted in no effect, suggested that different hours should have been used; or a music therapy may have not been effective because of the specific type of music chosen, the volume at which it was played, etc.

The active ingredient in the intervention. Even with convincing evidence that an intervention has been beneficial, the actual procedure responsible for this success is usually less clear. The reason for this ambiguity is that most intervention studies actually use several procedures in the treatment. For example, being taken for a walk outdoors involves social contact with the person who is accompanying the patient outdoors, a change in environment, outdoor light and air, etc; being read to involves some additional social contact with the person who is the reader; behavioral interventions frequently provide food and attention that were not otherwise available, etc. The question is, therefore: What is the important component of the intervention? Is it the treatment as titled—"reading," "differential reinforcement," and the like, or is it an unacknowledged component? One study that attempted to address this question compared hand massage to the mere presence of the nursing staff (60). In that case, mere presence had no effect, and the effect of the intervention was somewhat questionable. The potent role of social contact, which is involved in many of the interventions, is seen in a study that found social interaction to be a more successful intervention than individualized music or a videotaped family member for persons with verbal agitation (14). Its probable role is also seen in the significant placebo effect found in pharmacology studies. Some of the difficulties in clarifying the cause of effects in complex intervention trials are discussed in Cook and Campbell (61).

EFFECTIVENESS AND IMPLEMENTATION IN PRACTICE

The utilization of nonpharmacologic interventions in practice is limited. The biggest barrier is the lack of financial resources, or, stated otherwise, the lack of reimbursement. Whereas the use of psychotropic drugs is directly reimbursed, utilization of nonpharmacologic approaches is not. Furthermore, many of the more "medical" preventive treatments of inappropriate behaviors are not reimbursed, such as hearing aids or dental evaluations and treatment. Additional barriers include

lack of knowledge by caregivers as to how to care for persons who suffer from complex cognitive and medical disabilities, habits established in residential facilities over the years, the perception that medication is easier to administer, and a system that does not address the quality of living with dementia from a holistic point of view.

REASONS FOR LIMITATIONS IN AVAILABLE RESEARCH

The limited understanding of the usefulness of nonpharmacologic treatments stems not only from the limitations in current research, but also from the difficulties in conducting such research, with regard to inherent barriers—participants' limitations, system and caregiver issues, and external barriers.

Inherent barriers: participants' limitations. These involve the frailty of participants, where a significant proportion must be excluded during a study because of death or acute illness. Furthermore, the participants' limitations make the research process extremely dependent on the cooperation of the caregivers and the research setting. Such research calls for involving family caregivers in obtaining consent, requiring the assistance of formal caregivers for information and behavior ratings, and acquiring the collaboration of the nursing home, all of which make conducting research cumbersome. The barriers to communication and to implementation of interventions are numerous, and include participant disabilities in vision, hearing, language, or mobility. Finally, another hurdle in conducting this research lies in the inter- and intra-person variability in the manifestation of behavior. Indeed, the comments from several of the reviewed studies, which stated that baseline levels of inappropriate behaviors were probably too low to detect an effect as a result of an intervention, may be attributed to fluctuations in levels of agitation.

System and caregiver barriers. Relatives of potential participants frequently feel that their relative is too frail to participate in research, even when the research offers potential benefits and negligible risks. Many relatives feel the situation is hopeless and do not believe that any relief can be offered. The willingness to consent is even lower if the participant is assigned to a control condition. Nursing homes are also sometimes reluctant to involve themselves in the research process, either from fear of criticism or because they are wary of additional demands on over-burdened personnel. The nursing home's design, practices, schedule, and other system characteristics can also impede the implementation of nonpharmacologic interventions, even when the intervention would be more cost-effec-

tive in the long run. For instance, interventions with pet therapy would be much easier and more widely utilized if a pet lived on the premises, rather than having staff constantly schedule pets to be brought to the facility. However, implementing an on-site pet therapy program would require a system change. Many other interventions can be maximized via a system rather than a topical change. Finally, ethical considerations also limit the types of interventions and controls that can be performed.

External limitations. These stem from limited sources of funding (in comparison with drug research), resulting in utilization of only one or two sites and a limited number of participants. Indeed, much of the research in this area tends to be clinical research performed in the effort to improve care within a facility. Also, the combination of inherent and system difficulties in conducting this type of research is unfamiliar to many review committees, so that inappropriate expectations cause realistic studies to be rejected.

RECOMMENDATIONS: FUTURE DIRECTIONS

The results of the literature review show that many nonpharmacologic interventions show promise for treating inappropriate behaviors in dementia. The field needs to be expanded in a number of ways in order to have clinical usefulness. There is a need to address 1) the issue of individualization and proper selection of treatment: Which interventions are appropriate for which persons manifesting which behaviors? When is the goal enhanced stimulation and social contact, and when is it relaxation? Are some interventions always superior to others? 2) the specifics of the interventions: what characteristics of interventions optimize their impact? such characteristics include timing, duration, location, and intensity; 3) the issue of costs: When are lower-cost interventions comparable in effectiveness to higher-cost interventions? Which system issues need to be considered in order to make a quality approach fiscally viable? 4) the basic understanding of quality care in dementia: What is the best way to provide ADL care, sleep care, and mobility care that incorporates prevention and minimization of patient discomfort, and takes into account the interrelationship between system issues (e.g., waking the resident up for incontinence care may be important for skin care but may compromise sleep care)? What methods will best address the multiple interrelated aspects of functioning in a holistic fashion? and 5) system change: What types of training are needed, what changes in staffing roles and structure and ongoing feedback mechanisms are needed

to translate the research from efficacy to practice? More funding for research is needed to allow for larger and better-designed studies that can address some of the research methodology limitations described above. Finally, as such knowledge is gained, concomitant changes in reimbursement and the structure of system-of-care need to take place in order to improve the practice of dementia care.

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