Published in final edited form as:
J Am Geriatr Soc. 2010 August ; 58(8): 1459–1464. doi:10.1111/j.1532-5415.2010.02951.x.

Can Agitated Behavior of Nursing Home Residents with Dementia be Prevented With the Use of Standardized Stimuli?

Jiska Cohen-Mansfield, Ph.D.[1,2,3], **Marcia S. Marx, Ph.D.**[1], **Maha Dakheel-Ali, M.D.**[1], **Natalie G. Regier, B.A.**[1], **Khin Thein, M.D.**[1], and **Laurence Freedman, PhD**[4]

[1] Research Institute on Aging, Charles E. Smith Life Communities, Rockville, MD

[2] George Washington University Medical Center, Washington, D.C

[3] Tel-Aviv University's Herczeg Institute on Aging, Tel Hashomer, Israel

[4] Gertner Institute, Institute for Epidemiology and Health Policy Research, Tel Hashomer, Israel

Abstract

Objectives—The objective of this paper was to assess the relative impact of different types of stimuli on agitated behaviors of nursing home residents with dementia.

Design Setting/Participants—Participants were 111 residents of 7 Maryland nursing homes with a diagnosis of dementia who exhibited agitation.

Intervention—Different types of stimuli (music, social stimuli, simulated social stimuli, and individualized stimuli based on the person's self-identity) to prevent behavior problems.

Measurements—Agitation was directly observed and recorded via the Agitated Behaviors Mapping Instrument.

Results—All stimulus categories were associated with significantly less physical agitation than baseline observations, and all except for manipulative stimuli were associated with significantly less total agitation. Live social stimuli were associated with less agitation than music, self-identity, work, simulated social, and manipulative stimulus categories. Task and reading stimulus categories were each associated with significantly less agitation than work, simulated social, and manipulative stimulus categories. Music and self-identity stimuli were associated with less agitation than simulated social and manipulative stimuli.

Conclusion—Providing stimuli offers a proactive approach to preventing agitation in persons with dementia, with live social stimuli being most successful.

Keywords

dementia; agitation; prevention; stimuli; nursing home residents

Corresponding author: Jiska Cohen-Mansfield, Ph.D., ABPP, Director, Research Institute on Aging, 6121 Montrose Road, Rockville, MD 20852, 301-770-8449, Fax: 301-770-8455, Cohen-mansfield@hebrew-home.org.

Conflict of Interest: The editor in chief has reviewed the conflict of interest checklist provided by the authors and has determined that the authors have no financial or any other kind of personal conflicts with this paper.

Author Contributions:
1) JC-M: Conceptualized and designed study, analyzed and interpreted data, assisted with writing and editing the manuscript.
2) MSM: Conceptualized and designed study, analyzed and interpreted data, assisted with writing and editing the manuscript.
3) MD: Assisted with acquisition of subjects, collected data, analyzed and interpreted data.
4) NGR: Assisted with acquisition of subjects, collected data, assisted with writing and editing the manuscript.
5) KT: Assisted with acquisition of subjects, collected data, assisted with data analysis.
6) LSF: Assisted with analyzing and interpreting data and writing and editing the manuscript.

INTRODUCTION

Distinct syndromes of agitation, also termed behavior problems, include aggressive behaviors, physical non-aggressive behaviors such as inappropriate manipulation of objects, and verbal agitation.[1,2] When these types of behaviors are exhibited by people with dementia, caring for them is often overwhelming and cannot be managed in the community, and as a result, many are institutionalized. However, there is no guarantee that these behaviors will be managed any more effectively once agitated persons with dementia are institutionalized, as the focus in many nursing facilities is on completion of daily tasks rather than treatment of agitation. Clearly, there is a continuing need within the field of gerontology to identify ways to prevent and manage agitation in persons with dementia.

The pharmacological intervention approach posits that medication can be an effective treatment for agitation[3], but the level of effectiveness is moderate at best,[4,5] and the potential for side effects are substantial.[6–9] In contrast, studies have shown that non-pharmacological interventions can be effective in decreasing agitation without the risk of the potential side-effects of medication, while simultaneously address the underlying unmet needs of the older person.[10,11] As most nursing home residents spend much of their time unoccupied, a significant portion of their agitation is attributable to unmet needs related to boredom and confusion.[12,13] Consequently, many nonpharmacological interventions offer a wide variety of ways to engage older persons with dementia and provide them with enjoyable ways to pass the time.

Music has shown positive effects in decreasing agitation.[14–16] These studies found that music successfully reduced aggressive and negative behaviors in various settings and during specific activities, such as bathing and mealtimes. Additionally, music therapy, which included singing, playing instruments, and dancing, was reported to result in a significant decrease in agitation.[17,18]

Several studies show animal-assisted therapy to be beneficial in decreasing agitation in people with dementia.[19–22] One study found a decrease in agitation when using simulated animal-assisted therapy, i.e., a stuffed or robotic animal[23].

Social contact has been effective in decreasing agitation among people with dementia.[24,25] When relatives or friends are not present, simulated interaction, which involves presenting either audiotapes or videotapes of family members to the nursing home resident, has been shown to decrease agitation.[26–29] Moreover, structured activities, which range from trivia games to puzzles, have also been shown to have a positive impact on lowering agitation.[30–33]

Stimuli based on participants' self-identity have also been found to lessen agitation. Cohen-Mansfield, Parpura-Gill, and Golander[34] compared a control group to a treatment group, in which participants were engaged in activities corresponding to each one's most salient self-identity. The treatment group showed a significant increase in interest, pleasure, and involvement in activities, fewer agitated behaviors during treatment, and increased orientation in the treatment period.

The purpose of the present study was to assess whether the systematic presentation of different types of stimuli could prevent agitation in a nursing home population. With the exception of live stimuli, all stimuli required minimal staff involvement. In general, psychosocial interventions have an effect on agitated behavior during the intervention, with little-to-no impact after its termination. Consequently, we limited this study to a systematic exploration of the effects of a variety of stimuli on behavior problems in the short-term. We compared the efficacy of different types of stimuli for preventing agitation, and based on the

results of relevant existing literature, we hypothesized that: 1) all interventions would be preferable to no intervention and would offer a proactive approach to preventing agitation; 2) music, social stimuli, simulated social stimuli, and individualized stimuli based on the person's self-identity would have a significant effect on the prevention of behavior problems; and 3) self-identity interventions would have the greatest effect in lowering agitation when compared to the other interventions, because each self-identity intervention is tailored to the distinct characteristics of the participant.

METHODS

Participants

Our original pool of participants was 193 residents with dementia from 7 Maryland nursing homes who had participated in a study in which they were presented with different types of stimuli35. For this paper, we selected only those who manifested at least minimal levels of agitated behavior (so that we could examine the effect of stimulus presentation on agitated behavior). The criterion for exhibiting minimal levels of agitation was quantified as an average of at least 0.5 behaviors per 3 minute observation (equivalent to a CMAI score of 42). This translates to a resident manifesting the verbally agitated behaviors of both negativism and strange noises at a rate of once or twice a day as well as manifesting cursing several times a week and hitting once or twice a week; or, a resident manifesting physically agitated behaviors of restlessness and pacing, both at a rate of several times a day, as well as manifesting the verbally agitated behavior of repeating sentences or questions at a rate of several times a week. We excluded 50 of the residents as they did not meet the criteria for agitated behavior, and excluded another 32 because they did not have data for at least one of the stimuli (typically because they refused the stimulus). Therefore, our final sample includes 111 study participants. A comparison of included and excluded participants is presented in Table 1. As can be seen, the included (agitated) participants differed significantly from the other two groups with respect to gender and Mini-Mental State Examination (MMSE) scores36.

For the group of 111 participants, the average age was 85.4 years and 80.2% were female. The majority (78.4%) were Caucasian, and 60.4% of the participants were widowed. The average MMSE score was 5.

Assessments

Background assessment—Data pertaining to background variables were retrieved from the residents' charts at the nursing homes by a trained research assistant, and included information about gender, age, marital status, medical information (medical conditions from which the resident suffers; a list of medications taken), and performance of activities of daily living (ADL; from the Minimum Data Set [MDS])37. ADL performance was assessed for 10 activities (bed mobility, transferring, locomotion on the unit, dressing, eating, toilet use, personal hygiene, bathing, bladder incontinence and bowel incontinence) utilizing a scale from 1 to 5 (with 5 representing maximum dependence), and a mean ADL score was calculated for each participant. All participants had a diagnosis of dementia. The MMSE was administered to each participant by a research assistant that was trained with regard to standardized administration and scoring procedures.

Self-identity—Whenever possible, we interviewed the resident and conducted a telephone interview with the closest relative of the participant, in which the Self-Identity Questionnaire (SIQ)38 was administered to determine what roles were important and enjoyable to the participant before the onset of dementia as well as what activities are currently enjoyed. This assessment examines four types of role-identity: professional, family-role, leisure activities,

and personal attributes. Using the SIQ, we are able to prioritize role identities with respect to both the past and present (e.g., an identity that was very important in both the past and present would receive a higher priority than one that was important in only one timeframe). When there is a discrepancy among informants, we consider the participant's level of cognitive functioning. If the resident is either unable to answer the questionnaire properly, or the responses are limited, the SIQ from the relative is given priority. We individualize interventions according to the data obtained through the SIQ, focusing on activities related to specific role identities.

Agitation: Direct observations were recorded via the Agitated Behaviors Mapping Instrument (ABMI)1, for which a trained research assistant recorded the frequency of occurrence of 14 items describing problem behaviors, characterized as physical agitation (e.g., pacing, repetitive behaviors) or verbal/vocal agitation (e.g., screaming, complaining, groaning, attention seeking). Inter-rater reliabilities regarding agitated behaviors for this instrument averaged 0.931.

Procedure

Informed consent was obtained for all study participants from their relatives or other responsible parties. Additional information on the informed consent process is available elsewhere39. Our main criterion for inclusion was a diagnosis of dementia. The criteria for exclusion were:

- The resident had an accompanying diagnosis of bipolar disorder or schizophrenia.
- The resident had no dexterity movement in either hand.
- The resident could not be comfortably seated in a chair or wheelchair.
- The resident was younger than 60 years of age.

Once consent was obtained for eligible participants, background information was obtained from each participant's chart in the nursing home. In addition, the MMSE was administered to each participant. Each participant was then presented with 25 different predetermined stimuli (Table 2) over a period of three weeks (approximately 4 stimuli per day). Stimuli were grouped into the following 8 categories: *live social stimuli* (included a real baby, a real dog, and one-on-one socializing with a research assistant), *simulated social stimuli* (included a life-like baby doll, a childish-looking doll, a plush animal, a robotic animal [approximately $78 from stores such as Toys R'Us], and a respite video40,41), *manipulative stimuli* (included a squeeze ball, a tetherball, an expanding sphere, an activity pillow, building blocks, a fabric book, a wallet for men/purse for women, and a puzzle), *work related stimuli* (included stamping envelopes, folding towels, and sorting envelopes), *task related stimuli* (included flower arrangement and coloring with markers), *music stimulus* (included only listening to music), *reading stimulus* (included only reading a large print magazine), and *self-identity stimuli* (included 2 individualized stimuli which were matched to each participant's past identity with respect to occupation, hobbies, or interests). Self-identity stimuli therefore varied across participants, such that a book ledger could be given to a former accountant, while fabric samples could be presented to a former seamstress. With the exception of the self-identity stimuli, all stimuli were standardized across participants.

Baseline observations were performed daily for each study participant, prior to the initiation of the engagement trials, and consisted of a 3 minute observation in which the research assistant was not introduced to the study participant and no stimulus was presented. The timing of these observations was alternated, such that baseline would be conducted at the start of the morning session on Day 1 and then at the start of the afternoon session on Day 2, and so on. After baseline, a research assistant asked if the participant would like to engage in

the activity (and, in the case of work related activities, if they would help the research assistant) and then left the room. We recorded whenever the participant refused the stimulus (through words or actions). A second research assistant, who remained unobtrusive, observed the participant and recorded agitation via the ABMI, entering the data directly onto a Palm Pilot Zire31™ using a specially designed program. Each trial lasted 3 minutes. Trials took place between 9:30 am–12:30 pm and between 2 pm–5:30 pm, as these are the times that residents are not usually occupied with care activities at the nursing home (e.g., meals in the dining room, bathing). Individual trials were separated by an intertrial interval of at least 5 minutes. The order of stimulus presentation was randomized for each participant.

Analytic approach—Because of the skewed distribution of the agitation scores, we used nonparametric statistics, and provide median levels and ranks (ranks are often used in nonparametric statistics and refer to ordering of items so that one is ranked higher, lower or equal to another item) for levels of agitation under different conditions. To illustrate levels of agitation in this sample, we divided the sample into quartiles (groups containing 25% of the total participants) based on agitation levels at baseline. By using quartiles, we were able to divide study participants into four defined levels based upon agitation values at baseline, and then describe the responses of each quartile to the stimuli or during baseline. For each quartile group we present median levels of total agitation during baseline and during presentation of each stimulus category. Given the skewed distribution of agitation scores, we used the nonparametric within-subject Friedman test to compare the effects of the different stimulus categories. Post hoc comparisons were conducted using the procedure described in Table 8 of Christensen, Ogden, Dunn, & Eggett42.

RESULTS

In Table 3, we present the median level of agitation at baseline (bottom row) for each group based on baseline quartiles as well as during the presentation of each stimulus category. As can be seen in the table, levels were very low for the first quartile group, and lower than baseline for 5 of the 8 stimulus categories. In contrast, for the other three quartile groups, agitation levels were higher, and all medians in the stimulus categories were lower than for baseline.

Friedman test analyses comparing levels of agitation for the 8 stimulus categories and baseline were statistically significant for total agitation ($X^2_{(8)}= 76.8$, $p<0.001$), verbal agitation ($X^2_{(8)}= 75.5$, $p<0.001$), and physical agitation ($X^2_{(8)}= 105.3$, $p<0.001$; see Table 4). Post hoc analyses for total agitation revealed that all stimulus categories except for manipulative were associated with significantly less agitation than baseline observations. For physical agitation, the level of agitation was significantly lower for all stimulus categories in comparison to baseline. For verbal agitation, live social, task, reading, self identity, and music were associated with significantly less agitation than baseline. Additional examination of the post hoc analyses revealed a hierarchy among stimuli with regard to their effects on decreasing agitation. In the case of total agitation, live social, task, and reading stimuli did not significantly differ from each other, yet all 3 were significantly better (i.e., less agitation) than simulated social, manipulative stimuli and work. Music and self-identity stimuli had an intermediate position in the hierarchy as both were associated with significantly more agitation than live social stimuli (but not task or reading stimuli) yet significantly less agitation than manipulative stimuli, and self-identity stimuli were also associated with significantly less agitation than simulated social stimuli.

DISCUSSION

The results of the present study demonstrate that exposure to any type of stimulus is preferable to current nursing home standards of care, confirming our first hypothesis. The second hypothesis was also supported in that music, live and simulated social stimuli, and individualized stimuli based on the person's self-identity were all associated with decreased agitation. The third hypothesis, concerning the superiority of self-identity based stimulation over all other stimuli, was only partially supported. Only live stimulation was significantly superior to self-identity based stimulation, while self-identity stimulation was significantly superior to simulated social and to manipulative stimuli.

The results suggest that provision of stimuli is more effective for physical types of agitation than for verbal. This is congruent with prior findings that suggest that physical agitation is often the result of boredom43, a condition likely to be alleviated by stimuli, whereas verbal agitation has other etiologies (such as loneliness and pain), which require different approaches to prevention.

Live social stimuli were generally the most effective, but there was no clear "second-place" stimulus, as the categories of task, reading, music, and self-identity are all comparable. Work and simulated social stimuli seemed to be somewhat less effective, and the category associated with the least decrease in agitation relative to baseline was manipulative stimuli.

Self-identity based stimuli were significantly superior to some of the other stimulus categories (e.g., manipulative, simulated social), but were not found to be significantly different than several other categories of stimuli. They were significantly inferior only to live social stimuli, which are known to be extremely potent. Self-identity stimuli are therefore considered to have been relatively effective for the current sample. As for manipulative interventions, while these were indeed the least effective, these were nonetheless significantly superior to the no stimulus condition for physical agitation, most likely addressing a need for physical stimulation.

While the results showed a clear superiority of provision of stimuli over baseline of regular care, the hierarchy among the stimulus categories was much less clear, for which there are several possible explanations. First, despite meeting the criteria for manifestation of agitation in order to be included in this analysis, most participants were not agitated most of the time. Second, each category of stimuli includes several specific stimuli which are conceptually similar, but may or may not have the same impact on agitation. Third, the stimuli may have a distinct impact on different individuals based on their prior habits or current abilities. For example, the work-related stimulus of folding towels may be meaningful for a former homemaker, while the work-related stimulus of sorting envelopes would not have the same effect. Therefore, interventions truly do need to be individualized to a greater extent than just matching persons to categories that seem appropriate. Individualizing interventions according to cognitive functioning can play a role in the utility of stimuli, as our prior research found that participants with comparatively higher levels of cognitive functioning were more likely to spend time engaged in work activities, whereas those with low levels of cognitive functioning were more engaged by simulated social stimuli, which do not require active responses44. Functional and sensory limitations should also be taken into account when tailoring interventions to an individual.

The present study has several limitations. The sample of participants was chosen based on the criteria of being a nursing home resident and having a diagnosis of dementia, and was not based on clinical problems. Therefore, despite selection based on minimal levels of agitation, participants were not highly agitated most of the time and were generally less agitated than in studies where persons were specifically selected for agitation45. We believe

that these relatively low levels of agitation presented a floor effect and may have obscured and minimized the impact of the stimuli, thereby preventing us from presenting meaningful differences among individual stimuli. The relationship between agitation and dementia is complex, and nursing home residents with dementia manifest agitation in unique and varying degrees. The broad spectrum of agitation severity was not fully captured in this sample, and future research is needed to replicate the study in a sample that is more highly agitated. Another limitation is that the observation of agitation was brief, as only the immediate reaction (within the first 3 minutes) was recorded. Although agitation duration varies for each individual and within different contexts, persons with dementia frequently experience lengthy periods of agitation and the three minute observation cutoff may not allow for a comprehensive picture of individual agitation. Future research needs to ascertain whether populations with more extreme levels of agitation have similar responses to stimuli. Furthermore, when participants refused stimuli we did not record their level of agitation. Future researchers should examine agitation over longer periods and explore the relationship between refusals and the degree of agitation.

This study adds to the understanding of the ability of various stimuli to mollify and prevent agitated behaviors in persons with dementia. It is important to explore the effectiveness of these and other stimuli as non-pharmacological interventions before turning to medication, given the potentially harmful side-effects.[4,6,8,10,11,46] The findings have implications to practice in that they indicate that even the simple provision of stimuli may be useful in preventing agitation. Nursing home units with persons with dementia need to have stimuli appropriate for the residents available and need to train staff members in how to provide them as one of the practices for preventing agitation among residents with dementia. It is anticipated that further exploration of a range of stimuli and tailoring them to abilities and preferences will further enhance the preventive effect of such stimuli.

Acknowledgments

We thank the nursing home residents, their relatives, and the staff members and administration of the nursing homes for all of their help, without which this study would not have been possible.

This study was supported by National Institutes of Health grant AG R01 AG021497.

Sponsor's Role: None.

References

1. Cohen-Mansfield J, Werner P, Marx MS. An observational study of agitation in agitated nursing home residents. Int Psychogeriatr. 1989; 1:153–165. [PubMed: 2491142]
2. Rabinowitz J, Davidson M, De Deyn PP, et al. Factor analysis of the Cohen-Mansfield Agitation Inventory in three large samples of nursing home patients with dementia and behavioral disturbance. Am J Geriatr Psychiatry. 2005; 13:991–998. [PubMed: 16286443]
3. University of Rochester Medical Center. Medication helps quell the agitation of dementia. ScienceDaily. 2004. Retrieved April 10, 2009, from http://www.sciencedaily.com/releases/2004/07/040726090646.htm
4. Ballard C, Lana MM, Theodoulou M, et al. A randomized, blinded, placebo-controlled trial in dementia patients continuing or stopping neuroleptics (The DART-AD Trial). PLOS Medicine. 2008; 5 Article e76.
5. Rosenheck RA, Leslie DL, Sindelar JL, et al. Cost-benefit analysis of second-generation antipsychotics and placebo in a randomized trial of the treatment of psychosis and aggression in Alzheimer disease. Arch Gen Psychiatry. 2007; 64:1259–1268. [PubMed: 17984395]
6. Citrome L. Atypical antipsychotics, elderly patients, and mortality risk. South Med J. 2007; 100:964–965. [PubMed: 17943033]

7. Gill SS, Bronskill SE, Normand SL, et al. Antipsychotic drug use and mortality in older adults with dementia. Ann Int Med. 2007; 146:775–786. [PubMed: 17548409]
8. Jeste DV, Blazer D, Casey D, et al. ANCP white paper: Update on use of antipsychotic drugs in elderly persons with dementia. Neuropsychopharmacology. 2008; 33:957–970. [PubMed: 17637610]
9. Madhusoodanaan S, Shah P, Brenner R, et al. Pharmacological treatment of the psychosis of Alzheimer's disease: What is the best approach? CNS Drugs. 2007; 21:101–115. [PubMed: 17284093]
10. Cohen-Mansfield J. Nonpharmacological interventions for inappropriate behaviors in dementia: A review, summary, and critique. Am J Geriatr Psychiatry. 2001; 9:361–381. [PubMed: 11739063]
11. Cohen-Mansfield J, Mintzer J. Time for change: The role of nonpharmacological interventions in treating behavior problems in nursing home residents with dementia. Alzheimer Dis Assoc Disord. 2005; 19:37–40. [PubMed: 15764870]
12. Burgio LD, Scilley K, Hardin JM, et al. Studying disruptive vocalization and contextual factors in the nursing home using computer-assisted real-time observation. J Gerontol B Psychol Sci Soc Sci. 1994; 49:P230–P239.
13. Ice GH. Daily life in a nursing home: Has it changed in 25 years? J Aging Stud. 2002; 16:345–359.
14. 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. [PubMed: 10798453]
15. Hicks-Moore SL. Relaxing music at mealtime in nursing homes: Effects of agitated patients with dementia. J Gerontol Nurs. 2005; 31:26–32. [PubMed: 16375095]
16. Sherratt K, Thornton A, Hatton C. Emotional and behavioural responses to music in people with dementia: An observational study. Aging Ment Health. 2004; 8:233–241. [PubMed: 15203404]
17. Brotons M, Pickett-Cooper P. The effects of music therapy intervention on agitation behaviors of Alzheimer's disease patients. J Music Ther. 1996; 33:2–18.
18. Svansdottir HB, Snaedal J. Music therapy in moderate and severe dementia of Alzheimer's type: a case-control study. Int Psychogeriatr. 2006; 18:613–621. [PubMed: 16618375]
19. Churchill M, Safaoui J, McCabe BW, et al. Using a therapy dog to alleviate the agitation and desocialization of people with Alzheimer's Disease. J Psychosoc Nurs. 1999; 37:16–22.
20. Fritz CL, Farver TB, Kass PH, et al. Association with companion animals and the expression of noncognitive symptoms in Alzheimer's patient. J Nerv Ment Dis. 1995; 183:459–463. [PubMed: 7623018]
21. Kanamori M, Suzuki M, Yamamoto K, et al. A day care program and evaluation of animal-assisted therapy (AAT) for the elderly with senile dementia. Am J Alzheimers Dis Other Demen. 2001; 16:234–239. [PubMed: 11501346]
22. Zisselman MH, Rovner BW, Shmuely Y, et al. Pet therapy intervention with geriatric psychiatry patients. Am J Occup Ther. 1996; 50:47–50. [PubMed: 8644836]
23. Libin A, Cohen-Mansfield J. Therapeutic robocat for nursing home residents with dementia: A comparative study. Am J Alzheimers Dis Other Demen. 2004; 19:111–116. [PubMed: 15106392]
24. Cohen-Mansfield J, Werner P. Management of verbally disruptive behaviors in nursing home residents. J Gerontol A Biol Sci Med Sci. 1997; 52A:M369–M377. [PubMed: 9402944]
25. Runci S, Doyle C, Redman J. An empirical test of language-relevant interventions for dementia. Int Psychogeriatr. 1999; 11:301–311. [PubMed: 10547130]
26. Woods P, Ashley J. Simulated presence therapy: Using selected memories to manage problem behaviors in Alzheimer's disease. Geriatr Nurs. 1995; 16:9–14. [PubMed: 7860003]
27. Camberg L, Woods P, Ooi WL, et al. 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. [PubMed: 10203120]
28. Werner P, Cohen-Mansfield J, Fischer J, et al. Characterization and effectiveness of family-generated videotape for the management of VDB. J Appl Gerontol. 2000; 19:42–57.

29. Garland K, Beer E, Eppingstall B, et al. A comparison of two treatments of agitated behavior in nursing home residents with dementia: simulated presence and preferred music. Am J Geriatr Psychiatry. 2007; 15:514–521. [PubMed: 17293386]
30. Groene RW. Effectiveness of music therapy 1:1 intervention with individuals having senile dementia of the Alzheimer's type. J Music Ther. 1993; 30:138–157.
31. Aronstein A, Olsen R, Shulman E. The nursing assistants use of recreational interventions for behavioral management of residents with Alzheimer's disease. Am J Alzheimers Dis Other Demen. 1996; 11:26–31.
32. Sival RC, Vingerhoets RW, Haffmans PM, et al. Effect of a program of diverse activities on disturbed behavior in three severely demented patients. Int Psychogeriatr. 1997; 9:423–430. [PubMed: 9549591]
33. Kolanowski AM, Litaker M, Buettner L. Efficacy of theory-based activities for behavioral symptoms of dementia. Nurs Res. 2005; 54:219–228. [PubMed: 16027564]
34. Cohen-Mansfield J, Golander H, Arnheim G. Self-identity in older persons suffering from dementia: Preliminary results. Soc Sci Med. 2000; 51:381–394. [PubMed: 10855925]
35. Cohen-Mansfield J, Dakheel-Ali M, Marx MS. Engagement in persons with dementia: The concept and its measurement. Am J Geriatr Psychiatry. 2009; 17:299–307. [PubMed: 19307858]
36. Folstein M, Folstein S, McHugh P. Mini-mental state: A practical method of grading the cognitive state of patients for the clinician. J Psychiatr Res. 1975; 12:189–198. [PubMed: 1202204]
37. Morris, J.; Hawes, C.; Murphy, K., et al. MDS Resident Assessment. Natick, MA: Eliot Press; 1991.
38. Cohen-Mansfield J, Parpura-Gill A, Golander H. Utilization of self-identity roles for designing interventions for persons with dementia. J Gerontol B Psychol Sci Soc Sci. 2006; 61:202–212.
39. Cohen-Mansfield J, Kerin P, Pawlson LG, et al. Informed consent for research in the nursing home: Processes and results. Gerontologist. 1988; 28:355–359. [PubMed: 3396916]
40. Hall L, Hare J. Video respite™ for cognitively impaired persons in nursing homes. Am J Alzheimers Dis Other Demen. 1997; 12:117–121.
41. Lund DA, Hill RD, Caserta MS, et al. Video respite(™): An innovative resource for family, professional caregivers, and persons with dementia. Gerontologist. 1995; 35:683–687. [PubMed: 8543227]
42. Christensen ZT, Ogden LV, Dunn ML, et al. Multiple comparison procedures for analysis of ranked data. J Food Sci. 2006; 71:132–143.
43. Cohen-Mansfield, J. The language of behavior. In: Downs, M.; Bowers, B., editors. Excellence in Dementia Care. England: Open University Press; 2008. p. 187-211.
44. Cohen-Mansfield J, Marx MS, Dakheel-Ali M, et al. Can persons with dementia be engaged with stimuli? Am J Geriatr Psychiatry. 2010; 18:351–362. [PubMed: 20306565]
45. Cohen-Mansfield J, Libin A, Marx MS. Non-pharmacological treatment of agitation: A controlled trial of systematic individualized intervention. J Gerontol A Biol Sci Med Sci. 2007; 62:908–916. [PubMed: 17702884]
46. Douglas IJ, Smeeth L. Exposure to antipsychotics and risk of stroke: Self controlled case series study. Br Med J. 2008; 337:a1227. [PubMed: 18755769]

J Am Geriatr Soc. Author manuscript; available in PMC 2011 August 1.

Table 1

Background characteristics of selected (agitated) participants, not selected (non-agitated) participants, and participants excluded due to missing data

	Selected (agitated) n=111	Not selected (non-agitated) n=50	Missing data n=32	
Age	85.4 ± 8.4	86.8 ± 6.0	88.5 ± 5.9	$F_{(2,190)}=2.322$
Gender				
Female	80.2%	66.0%	90.6%	**$X^2_{(2)}=7.53^*$**
Male	19.8%	34.0%	9.4%	
White/Caucasian	78.4%	88.0%	81.3%	
Ethnicity				
African American	11.7%	6.0%	12.5%	White verses other $X^2_{(2)}=2.103$
Asian/Pacific Islander	6.3%	4.0%	3.1%	
Hispanic/Latino	1.8%	2.0%	3.1%	
Native American	0.9%	0.0%	0.0%	
Other	0.9%	0.0%	0.0%	
Widowed	60.4%	71.4%	71.0%	
Marital status				
Married	20.7%	16.3%	22.6%	Married verses other $X^2_{(2)}=0.579$
Divorced	11.7%	6.1%	0.0%	
Never married	4.5%	6.1%	6.5%	
Separated	2.7%	0.0%	0.0%	
ADL performance	2.3 ± 1.0	2.4 ± 1.1	2.8 ± 1.0	**$F_{(2,189)}=3.063^*$**
MMSE score	5.1 ± 5.8	10.5 ± 6.3	9.0 ± 5.6	**$F_{(2,185)}=15.869^{***}$**

* $p \leq .05$,

** $p \leq .01$,

*** $p \leq .001$

Table 2

Predetermined stimuli.

Stimulus category	Stimuli used
Live social	A real baby, a real dog, and one-on-one socializing
Task	Flower arrangement and coloring with markers
Reading	Reading a large print magazine
Self identity	Individualized stimuli which were matched to each participant's past identity with respect to occupation, hobbies, or interests
Music	Listening to music
Work	Stamping envelopes, folding towels, and sorting envelopes
Simulated social	A life-like baby doll, a childish-looking doll, a plush animal, a robotic animal, a respite video
Manipulative	A squeeze ball, a tetherball, an expanding sphere, an activity pillow, building blocks, a fabric book, a wallet for men/purse for women, and a puzzle
Baseline	No stimulation provided\usual care

Note: the order of stimuli was randomized

Table 3

Median levels for total agitation at baseline and during stimulus presentation for each stimulus group for four quartiles based on levels of agitation at baseline.

Baseline Group	1st Quartile	2nd Quartile	3rd Quartile	4th Quartile
Simulated Social	0.85	0.80	2.35	5.75
Manipulative	0.70	0.83	1.96	5.84
Music	0.50	1.00	0.00	6.00
Reading	0.00	0.00	0.75	5.50
Self-Identity	0.00	1.00	0.88	4.00
Work	0.67	0.67	2.25	4.92
Task	0.00	0.50	1.50	2.88
Live Social	0.00	0.00	0.00	4.00
Baseline	0.58	1.67	3.18	7.17

Note: Numbers represent number of agitated behaviors within a 3 minute observation (see text)

Table 4

Mean ranks[a] for the 8 stimulus categories and Baseline for total, verbal, and physical agitation and the resultant test statistics (n=111)

	Mean Rank		
Stimulus category	**Total agitation**	**Physical agitation**	**Verbal agitation**
Live social	3.92**	4.12**	4.11**
Task	4.32**	4.07**	4.78*
Reading	4.43**	4.44**	4.31**
Self identity	4.66**	4.95**	4.69**
Music	4.79**	4.79**	4.35**
Work	5.26**	4.83**	5.49
Simulated social	5.51*	5.21**	5.83
Manipulative	5.72	5.70**	5.75
Baseline	6.40	6.88	5.69
Friedman Chi-Square	$X^2_{(8)}$=76.8 p<.001	$X^2_{(8)}$=105.3 p<.001	$X^2_{(8)}$=75.5 p<.001

* p<.05;

** p<.01 for post hoc comparisons, statistically significant in comparison to Baseline

[a] *Note*: Each study participant had a score for level of agitation for each of the 8 stimulus categories and for baseline. These 9 scores were given a number from 1–9, according to the level of agitation observed. That is, if baseline was associated with the highest level of agitation, the participant received a score of 9 for the baseline observation. Alternately, if the live social category was associated with the least agitation, the participant received a score of 1 for that category. The results in the table are organized by these rankings for total agitation.