Efficacy of Theory-Based Activities for Behavioral Symptoms of Dementia

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Abstract:

Background: Agitation and passivity are behavioral symptoms exhibited by 90% of nursing home residents with dementia. They account for many poor health outcomes, caregiver burden, and increased costs of long-term care.

Objectives: This study tested the efficacy of recreational activities derived from the Need-driven Dementia-compromised Behavior (NDB) model: activities matched to skill level only; activities matched to style of interest only; and a combination of both (NDB-derived) for responding to the behavioral symptoms of dementia.

Methods: Thirty participants were randomly assigned to 1 of 6 possible order-of-condition presentations in this crossover experimental design with repeated measures of dependent variables. Trained research assistants, blind to condition match, implemented each condition for 12 consecutive days. Measures of engagement (time on task and participation), affect, and behavioral symptoms (agitation and passivity) were taken from videotape recordings of each session. Mood was measured with the Dementia Mood Picture Test. The primary analysis method was mixed-model analysis of variance.

Results: Significantly more time on task, greater participation, more positive affect, and less passivity were found under NDB-derived and matched to interest only treatments compared with the matched to skill level only treatment or baseline. Agitation and negative affect improved under all treatments compared with baseline. There was no significant change in mood.

Discussion: The NDB-derived activities are tailored to meet individual needs and improve behavioral symptoms associated with dementia. These findings help to explain factors that produce behavioral symptoms and the mechanisms that underlie their successful treatment.

Article:

Agitation and passivity are behavioral symptoms exhibited by 90% of nursing home (NH) residents with dementia and account for many poor health outcomes, including decline in physical functioning, social isolation, and increased risk of abuse (Cohen-Mansfield, Marx, & Rosenthal, 1989; Dyer, Pavlik, Murphy, & Hyman, 2000; Galynker, Roane, Miner, Feinberg, & Watts, 1995; Harwood, Barker, Ownby, & Ducra, 2000). These symptoms have contributed significantly to long-term care costs and have been a major source of caregiver burden (Donaldson, Tarrier, & Burns, 1997; Murman et al., 2002). As dementia progresses, many individuals exhibit both agitated and passive behaviors (Rubin, Morris, & Berg, 1987). This makes their pharmacological treatment difficult because the sedative effects of drugs used to treat agitation may increase passivity. Nonpharmacological interventions have been recommended as the first line of treatment for the behavioral symptoms of dementia (Teri et al., 2002).

Nursing science has few effective interventions for managing behavioral symptoms of dementia because these interventions have lacked a comprehensive theoretical base that takes the root causes into account. Theory-based interventions effectively target treatments. The purpose of this study was to test the efficacy of recreational activities derived from the Need-driven Dementia-compromised Behavior (NDB) model for responding to the behavioral symptoms of agitation and passivity in NH residents with dementia.

Agitation is (a) defined as verbal, vocal, or motor activity that may be abusive or aggressive toward self or others, (b) performed with inappropriate frequency, or (c) considered to be inappropriate by caregivers according to social standards for the specific situation (Cohen-Mansfield et al., 1989). Passivity is characterized by a lessening of mental processes, a decrease in ability to experience or respond to human emotions, fewer interactions with others or the environment, and a decrease in activity (Colling, 2000). Agitation and passivity seem to be opposites, but their causes may be similar: lack of appropriate stimulation from the physical and social environment. A relationship between personal care interactions with NH staff and resident agitation has been reported, especially during bathing (Roth, Stevens, Burgio, & Burgio, 2002; Sloane et al., 1998). Aside from personal care activities, NH residents spend much of their time “doing nothing,” and both agitation and passivity have been observed during these unoccupied times (Cohen-Mansfield, Werner, & Marx, 1992; Logsdon, 2000; MacRae, Schnelle, Simmons, & Ouslander, 1996; Perrin, 1997). Recreational activities are used to fill unoccupied time and may manage behavioral symptoms, but results of efficacy studies were modest (Beck et al., 2002; Opie, Rosewarne, & O'Connor, 1999). A limitation of these studies was that many lacked a theoretical basis for activity prescription.

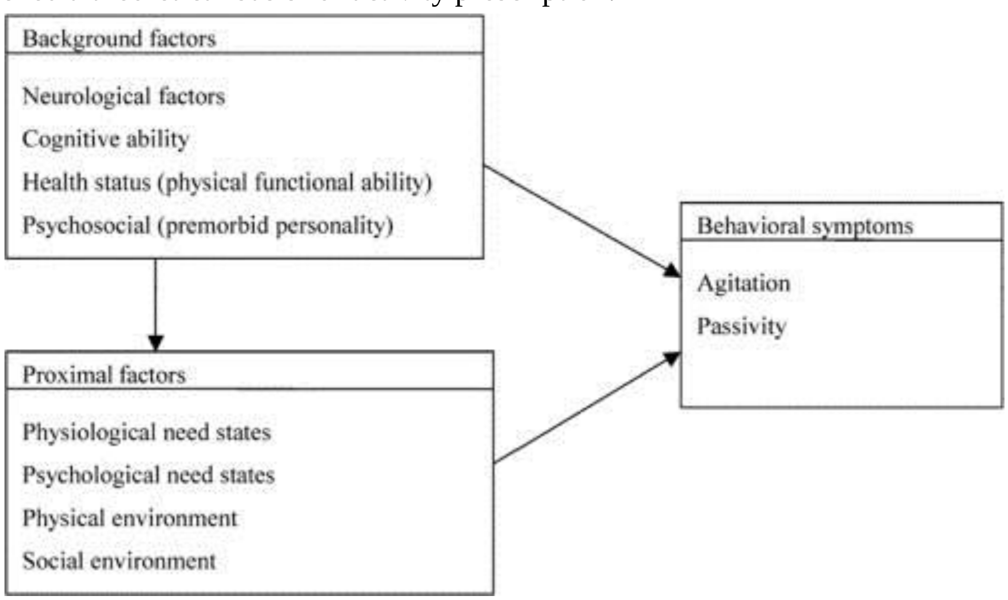

FIGURE 1. Need-driven Dementia-compromised Behavior Model.

Behavioral symptoms of dementia are addressed by the NDB model, which is a mid-range theory. The model, published elsewhere (Algase et al., 1996), changes the negative view of behavioral symptoms as “disruptive” or “inappropriate” to a perspective that conceptualizes these behaviors as indicating unmet needs that, if responded to appropriately, will enhance the quality of life. In the model, both background and proximal factors play a role in the occurrence of behavioral symptoms. Background factors are the more stable or slowly changing characteristics of the person with dementia such as neurological factors, cognitive abilities, health status and physical functioning, and psychosocial factors, including premorbid personality. Proximal factors are the more changeable characteristics of the person with dementia and the immediate environment such as physiological and psychological need states and characteristics of the physical and social environment (Figure 1). Some background factors may have a direct influence on behavioral symptoms, independent of proximal factors. Background factors also mediate the response to proximal factors to produce behavioral symptoms, the most integrated response a person can make, given the limitations imposed by the dementia, strengths preserved from abilities and premorbid personality, and the constraints or supports offered by the environment.

Recreational activities derived from the NDB model function as proximal factors that meet individual needs because they are tailored to enrich the physical and social environment by matching to the individual's background factors. First, NDB-derived activities are matched to the resident's current cognitive and physical functioning ability so that they are appropriate for his or her level of skill. Skill-appropriate activities not only facilitate engagement but also studies have shown that when people are absorbed in activities that match their ability, they experience positive emotions (Csikszentmihalyi & LeFevre, 1989). Second, NDB-derived activities match interests. The identification of recreational interests in the cognitively impaired is difficult and imprecise, and often done in a trial-and-error fashion. Using the NDB model, the identification of interests is accomplished by a systematic evaluation of premorbid personality, a background factor that can identify style of interest, a lifelong preference for certain types of activities.

A style of interest is defined by the personality traits of extraversion and openness (Costa, McCrae, & Holland, 1984; Holland, 1999). Extraversion reflects the amount of social stimulation preferred by the individual. Persons who rank high on this trait are outgoing and enjoy socializing with others, whereas persons who rank low on this trait prefer more solitary activities. The openness trait reflects the individual's tolerance for the unfamiliar. Persons who rank high on this trait enjoy new activities and like to explore their environment, whereas persons who rank low on this trait prefer more conventional activities. Traits remain relatively stable in adulthood (Hooker & McAdams, 2003), and there is evidence that facets of extraversion and the trait of openness maintain both rank order and mean level stability in dementia (Chatterjee, Strauss, Smyth, & Whitehouse, 1992; Siegler et al., 1991; Strauss, Lee, & Di Filippo, 1997). These long-standing tendencies have been used to identify activity interests in persons with dementia, and improved prescriptive precision over current approaches (Kolanowski, Buettner, Costa, & Litaker, 2001). Personality-based activities are designed to meet individual needs and preferences and thereby reduce behavioral symptoms.

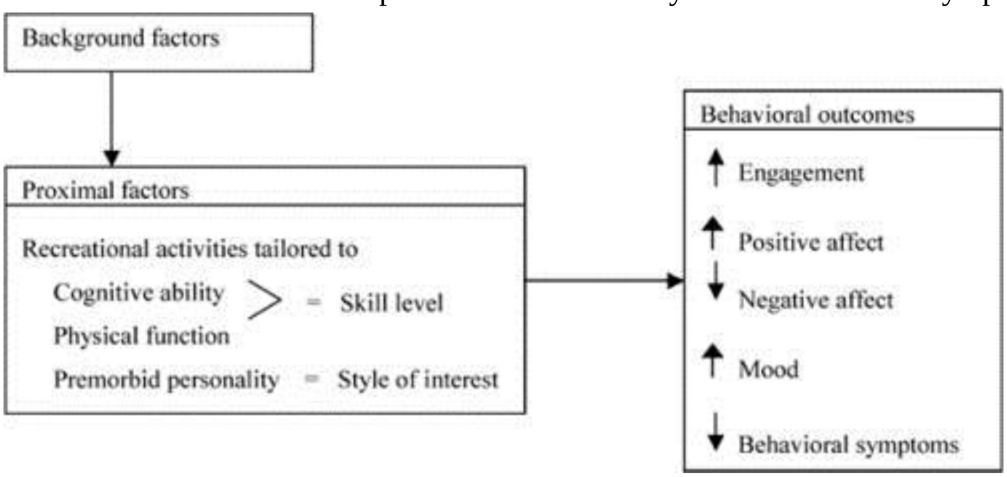

FIGURE 2. Causal model underlying treatment effect of Need-driven Dementia-compromised Behavior–derived recreational activities.

The causal model that underlies the treatment effect is illustrated in Figure 2. It is hypothesized that under implementation of NDB-derived recreational activities, NH residents with dementia will

1. exhibit greater engagement
2. exhibit more positive affect and less negative affect
3. report more positive mood
4. exhibit less agitation and less passivity

To test these hypotheses, (a) time on task and participation (engagement), (b) affect, (c) mood, and (d) behavioral symptoms (agitation and passivity) during implementation of NDB-derived activities were compared with these same variables during baseline and two treatments: activities matched to skill level only and activities matched to style of interest only.

This study used a crossover experimental design with repeated measures of the dependent variables. Measures of engagement, affect, and behavioral symptoms were taken from videotapes using a standard videotape-recording protocol. Measures of mood were obtained in real time by participant interview. The study examined components of the NDB-derived treatment (skill level match and interest match) that were hypothesized to result in therapeutic outcomes. Thirty participants served as their own controls and were assigned by the second author (M.L.) to one of six possible order-of-condition presentations using a permuted blocked randomization scheme. Five participants were assigned to each order of presentation. Trained research assistants, blind to condition match, implemented each activity condition for up to 20 minutes per day for 12 consecutive days, with a 2-day washout period between conditions.

Participants and Setting

Effect size estimates were calculated from a pilot study that had a similar design and dependent variables as this study. The power estimates were based on two-sided testing at [alpha] = .05, with a sample size of 30 participants. Estimated power to detect a medium effect size, expressed as a percentage, for dependent variables were time on task (83%); participation (99%); positive affect (99%); negative affect (40%); mood (66%); and agitation (96%).

The university institutional review board approved the study protocol. Elderly residents were recruited from four NHs located in northeast and central Pennsylvania. Written consent was obtained from each participant's responsible party and assent from the participant. Participants met the following inclusion criteria: (a) English speaking; (b) diagnosis of dementia that met Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria; (c) had a Mini-Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975) score of 24 or less; (d) had a willing informant who knew the participant well and who provided personality and other data; (e) had a stable dose of any psychoactive drug from prebaseline through final observation; and (f) exhibited behavioral symptoms as reported by staff and documented in the participant's Minimum Data Set. Exclusion criteria included history of psychiatric problems, alcoholism, diagnosis of Parkinson's disease, or stroke; Hachinski score above 4 to rule out vascular dementia; an average score for both extraversion and openness on the NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992) because these persons cannot be accurately classified on style of interest; a new psychoactive medication within the past 30 days; and an acute illness.

Enrollment began in April 2002 and follow-up ended in July 2003. Fifty-five participants met initial eligibility criteria; that is, they were identified by the NH as having Alzheimer's disease and behavioral symptoms. The responsible parties for 16 of these participants did not meet eligibility criteria as knowledgeable informants or could not be contacted for consent. Six of the 39 consented participants did not meet all eligibility criteria and were excluded. The remaining 33 participants were assigned to an order-of-condition presentation. Three of these participants were lost to follow-up. Two died before completing all conditions, and one was dropped because the presence of the video camera was upsetting to him. The final sample (N = 30), which included only those participants who had at least partial data for baseline and all three conditions, was primarily female (77%), White (100%), and widowed (71%), with a mean age of 82.3 (SD = 7.5) years, a mean educational level of 10.9 (SD = 2.5) years, and an MMSE score of 8.6 (SD = 7.2).

Mainstream Consumers (E+O−)

1. Group games: bowling or table games
2. Tether ball games: simple ball game with group
3. "The Price is Right": group game
4. Dancing: moving to music with a partner or in a group
5. Exercise to music: with others
6. Group sing-along: familiar songs with others in a group
7. Talk on the phone: phone pal
8. Humorous videos: watching with family or friends

Homebodies (E−O−)

1. Hang the laundry: hang socks on the line
2. Make a birdhouse: using precut wood
3. Apple peeler: make apple sauce
4. Make butter: shake heavy cream until it turns to butter
5. Pet visits
6. Sewing cards
7. Cooking project
8. Starting seeds indoors

Creative Interactors (E+O−)

1. Reminiscence group
2. Make a mosaic with tiles in group
3. Feeling cube—validation therapy—roll the feeling dice and talk about the emotion that comes up in a group
4. Wandering cart: use cart to wander facility and use items in pockets to interact with others
5. Bell group: using colored bells in a small group to make music
6. Make pleasure books: use book-making kits to create theme project in a group
7. Group quilting: using fabric squares to create a colorful decoration item
8. Group photo session: bring photos of self and talk about who we are

Introspectors (E−O+)

1. Decorate beads and stringing: use an assortment of beads and findings to decorate beads and string them in a creative way
2. Activity Apron (or Fishing Box): wear apron that has pockets filled with interesting items to examine
3. Make holiday greeting cards
4. Mind teaser puzzle: take precut wood puzzle and use patterns to make it interesting and colorful
5. Go for nature walks: collect leaves, flowers, etc.
6. Look and handle wave machine
7. Listen to short story
8. Listen to poetry

[a] Activities that can be done in a one-on-one context are assigned to low extraversion quadrants (E−). Activities that involve socialization with others are placed in high extraversion quadrants (E+). Activities enjoyed by the mainstream are placed in low openness quadrants (O−), whereas those that involve feelings, creativity, or curiosity are placed in high openness quadrants (O+).

TABLE 1. Activities by Style of Interesta

Intervention

Clinical practice and research were the basis for the recreational activities tested in this study (Buettner, 1999). These activities are age-appropriate and disease-stage—appropriate designed for NH residents with dementia. An earlier project (Kolanowski et al., 2001) describes in detail how activities were classified by style of interest so that their selection matched participants' long-standing preference for social stimulation (extraversion) and novelty (openness). Descriptors for the traits of extraversion and openness (Table 1) were used to classify personality-appropriate activities in one of four style of interest categories developed by Costa and McCrae (1998): Mainstream Consumers (high on extraversion and low on openness); Creative Interactors (high on extraversion and high on openness); Homebodies (low on extraversion and low on openness); and Introspectors (low on extraversion and high on openness). The trait of extraversion was used to prescribe the context of the activity (small group for those high on extraversion vs. one-on-one for those low on extraversion), and the trait of openness was used to prescribe the content of the activity (artistic pursuits, expression of feelings and curiosity for those high on openness vs. the more prosaic, familiar and conventional for those low on extraversion).

Instruments

The assessment and results of these data were collected by a geriatric clinical nurse specialist or nurse practitioner and used for activity prescription.

Cognitive ability was assessed using the Folstein MMSE (Folstein et al., 1975), a brief standardized cognitive screen that includes items on orientation, registration, memory, attention, and concentration. The score is the sum of correct responses and ranges from 0 to 30. Scores below 24 indicate global cognitive impairment. The MMSE has test-retest reliability (24 hours) of .83 and validity demonstrated by positive correlations on the verbal (r = .78) and performance (r = .66) sections of the Wechsler Adult Intelligence Scale (Folstein, Folstein & McHugh, 1975).

Physical functioning was assessed using the physical capacity subscale of the Psychogeriatric Dependency Rating Scale (PGDRS; Wilkinson & Graham-White, 1980). Seven items on hearing, vision, speech, mobility, dressing, personal hygiene, and toileting are rated on a Likert-type scale. Scores range from 0 to 34, with higher scores indicating greater dependency. The physical capacity subscale of the PGDRS has an interrater reliability of .87 and convergent validity with independent measures of nursing time demanded ($r = .72$; Wilkinson & Graham-White, 1980).

Style of interest was assessed using the NEO-FFI (Costa & McCrae, 1992), a 60-item Likert-type self-report adapted for informant use. The NEO-FFI assesses adult personality in five domains: neuroticism, extraversion, openness, agreeableness, and conscientiousness. Taken from the longer 240-item NEO Personality Inventory (NEO-PI), the shorter version reduces respondent burden and correlates with the longer version, with coefficient [alpha]s ranging from .75 to .89. When rating the participant, the informant was asked to think of the participant as he or she was 10 years prior to the onset of dementia. This allowed a reasonable “outer limit” of a participant's onset of dementia and a more accurate assessment of traits (Richman, 1989). The participant's scores on extraversion and openness were converted to t scores [Latin capital letter X with macron above] = 50; SD = 10) and used to identify style of interest. Scores of 50 and above were considered high and those below 50 were considered low.

Dependent measures were taken from videotapes by trained research assistants blind to condition match. Engagement was the time in minutes and seconds (time on task) that the participant participated in each activity session and the intensity of participation. Time on task was measured using a stopwatch, starting from the initiation of engagement in activity and ending at 20 minutes or when the participant disengaged from the activity. Raters followed decision rules for identifying when the participant was “engaged” and when “disengaged.” Intensity of participation was measured using a method developed by Kovach and Magliocco (1998). Participation was rated on a scale of 0 (dozing) to 3 (actively engaged). The scale has descriptors for each numerical rating. Interrater reliabilities (ICC) of .99 for time on task and .83 for participation were obtained.

Affect was measured using the Philadelphia Geriatric Center Affect Rating Scale (ARS; Lawton, Van Haitsma, & Klapper, 1996). The observational scale has descriptive indicators for six affective states: pleasure, anger, anxiety, depression, interest, and contentment. The rater estimated the portion of a 20-minute behavior stream on which any of these affects were evidenced. Scores were obtained for both positive and negative affects, with higher scores indicating more of either affect. Interrater reliability for the ARS was found to be .93.

Mood was measured in real time using the Dementia Mood Picture Test (DMPT; Tappen & Barry, 1995), an instrument that measures both positive and negative moods from the perspective of the cognitively impaired participant. Measures were taken immediately before and immediately after each observation period. The dependent variable for change in mood was the difference between the postmeasurements and premeasurements of DMPT (total) within each day. The participant was shown six “faces” and asked to indicate if the drawing represents how he or she feels. The participant received a total score between 0 and 12, with higher scores representing more positive mood. The instrument has demonstrated high interrater reliability (ICC) of .95 to .99.

Behavioral symptoms were measured using the Cohen-Mansfield Agitation Inventory (CMAI; Cohen-Mansfield et al., 1989) and the Passivity in Dementia Scale (PDS; Colling, 2000). The CMAI is a caregiver-rating questionnaire that consists of 29 agitated behaviors that are rated on a 7-point scale of frequency. The CMAI, modified for direct observation, was used to rate agitation during observation periods (Chrisman, Tabar, Whall, & Booth, 1991). The rater indicated which of the 29 dementia behaviors occurred in 5-minute blocks of time. A sum score was obtained. Interrater reliabilities for the CMAI have ranged from .92 to .95; the scale has reported convergent validity with the Ward Behavior Inventory (Cohen-Mansfield & Billig, 1986). The PDS is an observer rating scale of 42 behaviors: 12 passive behavior items scored in the negative and 30 active behavior items scored in the positive. Lower scores indicate greater passivity. Five subscale scores were obtained on cognition, emotions, interaction with the environment, interaction with persons, and psychomotor activity. The rater indicated which of the 42 behaviors occurred in 5-minute blocks of time. A sum score was obtained. Internal consistencies (Cronbach [alpha]) of .71 to .94 were obtained for the subscales and interrater reliability of .80 for the total scale.

Procedure

Prebaseline

Observations made hourly (7 a.m. to 7 p.m.) for 5 consecutive days using the CMAI and PDS included those participants who met enrollment criteria. This was done to determine the type of behavior exhibited and the time of day when these behaviors were most likely to peak.

Baseline

For 12 consecutive days, each participant was observed and videotaped for 20 minutes each day at the time point when he or she exhibited peak behavioral symptoms as determined in prebaseline. If a participant exhibited behaviors at a constant rate across the 7 a.m. to 7 p.m. time frame, or they exhibited several peak times, or they exhibited both agitation and passivity, we randomly selected one of these times/behaviors for observation. Measures of affect and behavioral symptoms (agitation and passivity) were taken from videotapes of each observational session. Mood was measured in real time at the beginning and completion of each observational session by participant interview.

Treatments

The first (A.K.) and third (L.B.) authors prescribed activities based on each participant's cognitive abilities, physical functioning, and style of interest as assessed by the MMSE, PGDRS, and NEO-FFI, respectively. Each participant's performance on the individual items that composed the first two instruments was reviewed to determine the cognitive and physical functioning skills they retained. Each participant's scores on the extraversion and openness scales of the NEO-FFI were used to identify the style of interest category that characterized them. The information on skill level and style of interest guided decisions about activity prescription. Activities were matched to skill level only (treatment A), style of interest only (treatment B), and skill level and style of interest (treatment C). For treatment A, participants received activities matched to their cognitive and physical functioning (skill) level, but opposite their identified style of interest (i.e., from the style of interest category diagonal to their identified style of interest category; Table 1) For example, a participant who scored low on extraversion and low on openness (E-O-) would receive skill-appropriate activities that appealed to artistic interests in a small group (E+O+) for his or her treatment A. For treatment B, participants received activities that matched their style of interest, but not their skill level. For treatment C, participants received activities that were matched to both skill level and style of interest. The research assistants who implemented conditions were undergraduate nursing or recreational therapy students who completed a 2-day training session on the intervention protocol. These trained interventionists were blind to condition match and implemented treatments for up to 20 minutes at each session. Each treatment was given for 12 consecutive days at peak behavior time. To ensure treatment fidelity, random manipulation checks were preformed by the principal investigator on at least 20% of sessions for each condition. These manipulation checks verified, by direct observation, that the interventionist implemented the activity that was prescribed for that session and maintained the activity protocol. If the protocol was not maintained, re-training occurred.

Statistical Methods

Data analysis was carried out according to a preestablished “on treatment” analysis plan that included all observations obtained for each of the 30 participants who had at least partial data for baseline and all three treatment conditions. Sample distributions were examined for each variable, within participant and treatment.

Measured values were plotted by day of treatment for each participant to evaluate possible trends across the days of observation for each treatment condition. Distributions of residual values were examined for the normal-distribution-based statistical models to ensure that the assumptions of the analytic methods were met. The primary analysis method was mixed-model analysis of variance (ANOVA) using participant as the random effect and treatment as a fixed effect. Post hoc pair-wise comparison of treatment means was performed using Tukey's test and was based on least squares means to account for unequal replication due to missing values. Comparison of each treatment mean versus the mean for the baseline condition was performed regardless of the results of the overall test for differences among treatment means. As these were preplanned pair-wise comparisons, each was performed at the 95% confidence level (CI). The analysis was done in two steps. First, separate ANOVA analyses were performed for each of the treatments to evaluate change across days for time on task, positive affect, negative affect, mood, agitation, and passivity. The analysis of participation scores was analogous, but used generalized estimating equation analysis with a multinomial model for the four possible values of the participation score (0, 1, 2, 3). Following this analysis, each participant's scores were averaged across days within treatments to address large differences in within-participant variability, and mixed-model ANOVA was then used to compare mean scores among the treatments.

Results

The means, standard deviations, and 95% CIs for the dependent variables are listed in Table 2. No significant trend across days of treatment was found for any of the dependent variables. There was a significant difference in mean time on task among the treatments ($p = .001$). The least squares means for treatment C was significantly higher than for treatment A ($p = .001$), but not significantly different from treatment B ($p = .371$). Treatment B was significantly higher than treatment A ($p = .040$). There was a significant difference in mean participation among the treatments ($p < .001$). The least squares means for treatment C was significantly higher than that for treatment A ($p < .001$) or treatment B ($p = .003$). Treatments A and B were not significantly different ($p = .442$).

	M (SD) CI			
	Baseline	Condition A	Condition B	Condition C
Engagement				
Time on task	Not measured	13.38 (4.1) 11.9, 14.8	15.29 (4.7) 13.6, 17.0	16.33 (4.0)[a] 14.9, 17.8
Participation	Not measured	2.13 (0.6) 1.9, 2.3	2.24 (0.7) 2.0, 2.5	2.55 (0.6)[b] 2.3, 2.8
Affect				
Positive	11.35 (1.9) 10.7, 12.0	12.06 (1.7) 11.5, 12.7	12.38 (1.8) 11.7, 13.0	13.00 (1.7)[c,d] 12.4, 13.6
Negative	3.81 (1.4) 3.3, 4.3	3.45 (0.5) 3.3, 3.6	3.35 (0.5) 3.2, 3.5	3.44 (0.8)[e] 3.2, 3.7
Mood				
Pre	8.26 (2.6) 7.3, 9.2	8.08 (2.4) 7.2, 9.0	8.03 (2.5) 7.1, 9.0	8.32 (2.5) 7.5, 9.5
Post	8.37 (2.6) 7.4, 9.3	8.07 (2.5) 7.1, 9.0	8.09 (2.6) 7.1, 9.1	8.48 (2.7) 7.5, 9.5
Difference	0.04 (0.8) − 0.3, 0.3	−0.09 (0.8) −0.4, 0.2	0.05 (0.7) −0.3, 0.4	0.10 (0.9) −0.2, 0.4
Behavior				
CMAI	2.85 (3.4) 2.0, 3.7	1.35 (1.8) 0.5, 2.2	1.09 (1.5) 0.3, 1.9	1.14 (1.9)[e] 0.3, 2.0
PDS				
Thinking	3.84 (2.8) 1.6, 6.0	6.88 (6.0) 4.7, 9.1	7.77 (6.7) 5.6, 10.0	9.82 (8.0)[c,e] 7.6, 12.0
Emotion	4.87 (7.2) 2.6, 7.1	7.58 (4.9) 5.3, 9.8	7.97 (5.5) 5.7, 10.2	10.71 (7.2)[c,e] 8.5, 13.0
Interaction with environment	5.51 (2.4) 4.1, 6.9	8.66 (3.7) 7.2, 10.0	9.97 (4.4) 8.6, 11.3	11.70 (4.8)[c,e] 10.3, 13.1
Interaction with people	7.70 (5.6) 6.0, 9.4	12.12 (3.8) 10.4, 13.8	13.11 (4.7) 11.4, 14.8	14.83 (4.7)[c,e] 13.1, 16.5
Activities	−3.10 (3.7) −4.4, −1.8	1.46 (3.0) 0.1, 2.8	2.02 (4.0) 0.7, 3.4	3.10 (4.1)[c,e] 1.8, 4.4

Note. CMAI = Cohen-Mansfield Agitation Inventory; PDS = Passivity in Dementia Scale.
Significant differences among conditions A, B, and C are:
[a]A vs. B and A vs. C.
[b]A vs. C and B vs. C.
[c]A vs. C.
Significant differences from baseline are:
[d]Conditions B and C different.
[e]All conditions different.

TABLE 2. Means (M), Standard Deviations (SD), and Confidence Intervals (CIs) for Dependent Variables by Treatment Condition

There was a significant difference in positive affect among the treatment means ($p < .001$). Positive affect was significantly lower for baseline than for treatments B ($p = .009$) or C ($p < .001$), but not for treatment A ($p = .124$). Positive affect was significantly higher for treatment C than for treatment A ($p >= .021$), but not for treatment B ($p = .219$). Treatments A and B were not significantly different ($p = .748$). There was not a significant difference among the treatment means for negative affect, although the p was very close to the .05 cut point ($p = .056$), suggesting there may be some treatment effect. The preplanned comparisons with baseline do show significant differences for baseline versus treatment A ($p = .046$), baseline versus treatment B ($p = .011$), and baseline versus treatment C ($p = .042$). There was less negative affect under all three treatments compared to baseline.

There was no significant difference in mood change score (post, pre) among treatments ($p = .860$) and none of the treatments were different from baseline ($p = .542$ for treatment A, $p = .997$ for treatment B, $p = .831$ for treatment C).

For agitation, participants showed little variability in CMAI scores across days within treatments. There was a significant difference in mean score among the treatments ($p < .001$). Under treatments A, B, and C, there was significantly less agitation ($p = .007$ for treatment A, $p = .001$ for treatment B, $p = .002$ for treatment C) than during baseline There were no significant differences among treatments A, B, and C (all $p > .940$).

For each subscale of passivity, all three active treatments significantly reduced passivity compared with baseline, with the exception of emotions, where treatment A did not differ from baseline. The treatment comparisons indicated that for each subscale, treatment C resulted in significantly less passivity compared with treatment A, but not treatment B, and treatments A and B did not differ. Significance levels for each subscale are as follows: (a) for thinking, there was a significant difference between treatment means ($p < .001$).

Treatments A, B, and C were significantly different from baseline ($p = .026$ for treatment A, $p = .002$ for treatment B, and $p < .001$ for treatment C). Treatment C differed significantly from treatment A ($p = .033$), but not treatment B ($p = .220$). Treatments A and B were not different ($p = .833$); (b) for emotions, there was a significant difference between treatment means ($p < .001$). Baseline was significantly different from treatments B ($p = .047$) and C ($p < .001$), but not from treatment A ($p = .103$). Treatments A and C differed significantly ($p = .043$), but there was no difference between treatments A and B ($p = .987$) or B and C ($p = .096$); (c) for interacting with the environment, there was a significant difference among treatments ($p < .001$). All treatment means differed significantly from baseline ($p < .001$ for treatment A, $p < .001$ for treatment B, and $p < .001$ for treatment C). Treatment C differed from treatment A ($p = .001$), but not B ($p = .135$). Treatments A and B were not different ($p = .349$); (d) for interacting with persons, there was a significant difference among treatments ($p < .001$). Baseline was significantly different from treatments A ($p < .001$), B ($p < .001$), and C ($p < .001$). Treatment C was different from treatment A ($p = .016$) but not B ($p = .225$). Treatments A and B did not differ ($p = .679$); (e) for psychomotor activity, there was a significant difference among treatments ($p < .001$). Baseline was significantly different from treatments A ($p < .001$), B ($p < .001$), and C ($p < .001$). Treatment C was different from treatment A ($p = .046$), but not B ($p = .305$). Treatments A and B did not differ ($p = .802$).

Discussion

In this treatment efficacy study, it was hypothesized that participants would exhibit improved outcomes under implementation of NDB-derived recreational activities that were matched to their skill (cognitive and physical functioning) level and style of interest (premorbid personality) as compared with recreational activities matched to only one of those treatment components or baseline. It was found that agitation and passivity responded best to different treatments, but that NDB-derived activities were efficacious for a broader spectrum of behavioral outcomes than either of the other conditions. These outcomes were obtained without occurrence of any adverse events attributable to the treatments.

It was hypothesized that participants would exhibit greater engagement (time on task and participation) under NDB-derived activities than under comparison activities (matched to skill level only or matched to interest only). This hypothesis was partially supported. Participants spent more time on task when the activity captured their interests; that is, it was tailored to either their interests and skills (NDB-derived) or interests alone, and thus was consistent with their personality. However, they were scored (timed) as being “on task” when they were both actively and passively engaged. Participation was the measure that differentiated levels of engagement, and they participated more actively when the activity was tailored to both interests and skill level (NDB-derived). Interest match may be a key treatment component for maintaining attention, but participants cannot fully participate in activities that require skills they have lost. Grant and Potthoff (1997) found that use of skill-appropriate activities improved participation in their study of NH residents with dementia. Participation was improved over either treatment component alone by matching activities to both skill level and interests.

It was hypothesized that participants would exhibit more positive affect and less negative affect under NDB-derived activities than under baseline or the comparison activities. Partial support for this hypothesis was found. Positive affect was improved over baseline and activities matched to skill level only, when implemented activities were matched to interests only or matched to both interest and skill level (NDB-derived). Like time on task, positive affect responded best when the participant's style of interest was identified and used in the prescription of activities. Alternatively, a weak treatment effect for negative affect was found. A preplanned comparison indicated that any type of activity improved negative affect over baseline. Negative affect was not frequently observed in these participants. In addition, a power of 40% was used to detect a treatment effect for negative affect. These issues most likely contributed to the lack of significant findings for negative affect. These findings are similar to Beck et al. (2002) who found significantly more positive affect, but no reduction in negative affect or agitation, following implementation of tailored behavioral interventions for NH residents with dementia. They too found little negative affect, and concluded that their nontargeted interventions need to be more precisely designed to improve a broader range of behavioral outcomes. The current NDB-derived interventions were targeted at unoccupied time, but a larger sample size could have provided more definitive findings on the relationship between the intervention and negative affect.

It was hypothesized that participants would report more positive mood under NDB-derived activities than under baseline or the comparison activities. This hypothesis was not supported. No significant change in mood under any of our treatments was found. However, in pilot work, it was found that NDB-derived activities improved mood over other active treatments when activities were given twice a day for 3 weeks, suggesting that dosage may be an important factor here (Kolanowski, Litaker, & Baumann, 2002). The power was somewhat low for testing this hypothesis and a larger sample might yield significant results. These results may stem from a limitation of the self-report method in this population.

It was hypothesized that participants would exhibit less agitation and less passivity under NDB-derived activities than under baseline or the comparison activities. Partial support for this hypothesis was found. Like negative affect, agitation did not demonstrate a differential response to any of the active treatments. Any treatment reduced agitation compared with baseline. It may be that the diversion present in any type of activity is sufficient for the successful treatment of agitation. However, we did not look at the impact of our interventions outside of treatment times. Work by Kovach and Wells (2002) indicates that balancing the daily activity schedule so that residents are not overaroused or underaroused for long periods of time reduces agitation. The NDB-derived activities are designed to be compatible with residents' stimulation needs and may be well-suited to maintaining arousal balance throughout the day while minimizing polypharmacy. Evaluation of their efficacy is needed within the context of longer periods of time in addition to their immediate effect during treatment. Passivity, on the other hand, responded best when activities matched interests either alone or matched to both interest and skills. Passivity is reported to be particularly resistant to intervention (Everitt, Fields, Soumerai, & Avorn, 1991), and residents who display this behavior are more behaviorally activated when activities are designed to be compatible with their individual needs for social stimulation and novelty.

Because passive residents are at a high risk for functional decline, nonpharmacological interventions that reduce withdrawn behavior without troublesome adverse effects are particularly advantageous.

The current findings support the use of the NDB model as a framework for understanding the behavioral symptoms of dementia and help to elucidate the mechanisms that underlie their successful treatment. Studies have shown relationships between the individual NDB background factors of premorbid personality traits, cognitive abilities, and physical functioning and the behavioral symptoms of dementia (Harwood et al., 2000; Kolanowski, Strand, & Whall, 1997; Strauss et al., 1997). The current study confirms the importance of these background factors, especially premorbid personality, when responding to the behavioral symptoms of dementia. Prior research has indicated that recreational activities capture interest when they meet individual needs (Tinsley & Eldredge, 1995). Style of interest, which is based on an assessment of personality, is an individual's long-standing disposition to gratify needs in a particular manner (Costa & McCrae, 1998). The NDB model posits that when proximal factors are manipulated in a way that meets individual needs, behavioral symptoms are reduced. The recreational activities that were tailored to style of interest reduced passivity to a greater extent than activities not tailored to style of interest. In addition, engagement and positive affect were improved under interest-matched activities. On the other hand, negative affect, mood, and agitation may be behavioral symptoms that are not be fully explained by the NDB model as currently conceptualized.

On the basis of these findings, agitation and negative affect may not require a prescriptive approach beyond simple diversion. It is noted, however, that dosage, the number of times the activity is given each day and the length of each treatment, may be an issue here. A recent study by Kovack et al. (2004) has shown that reducing arousal imbalances by scheduling activities so that residents were not overaroused or underaroused for long periods of time throughout the day reduced agitation. Research using larger sample sizes or more frequent doses of NDB-derived activities, or both, may help clarify the model's utility for explaining these behavioral outcomes.

Behavioral interventions are recommended as a first line of treatment for the behavioral symptoms of dementia. Because they are tailored to the individual's profile, NDB-derived activities meet individual needs. Thus they have the potential to reduce behaviors that signify unmet needs and to promote behaviors that indicate improved quality of life.

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