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Effect of Exercise on Mood in Nursing Home Residents With Alzheimer's Disease

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Abstract

The purpose of this study was to examine the effects of 3 behavioral interventions on affect and mood in nursing home residents with Alzheimer's disease. In a pre–post design, 90 residents with Alzheimer's disease were randomized to 3 groups: supervised walking, comprehensive exercise (walking plus strength training, balance, and flexibility exercises), and social conversation (casual rather than therapeutic themes). Interventions were provided 5 days a week and progressed up to 30 minutes per session over 16 weeks. Interventions were conducted primarily indoors. Outcome measures included the Lawton Observed Affect Scale, Alzheimer Mood Scale, and Dementia Mood Assessment. At posttest, participants receiving comprehensive exercise exhibited higher positive and lower negative affect and mood. The social conversation group exhibited the least positive and most negative mood and affect. Results suggest that exercise programs be emphasized in long-term care, particularly whole-body involvement rather than walking alone.

Keywords

exercise; affect; mood; Alzheimer's disease; dementia

Positive mood is an integral component of quality of life for nursing home residents with Alzheimer's disease (AD).[1] Traditional interventions to improve mood such as cognitive and interpersonal therapies require communication abilities that may be compromised in individuals with AD.[2] An intervention suited to nursing home residents with AD that would increase positive mood would improve quality of life for the resident. Exercise has the potential to meet these requirements.

Definitions

Although often used interchangeably, the terms *emotion*, *affect*, and *mood* refer to different feeling states. *Emotions* are specific feelings that arise in response to a particular stimulus. *Moods* are more enduring global states. *Affect* is the general valence (positive or negative) of that state and accounts for much of the variance in the state.[3] According to *Diagnostic and Statistical Manual of Mental Disorders (DSM)*[4] criteria, *depression* is persistent low mood or loss of interest in activities once enjoyed.

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The authors have reported no conflicts of interest.

Review of the Literature

Activities and Positive Mood in Cognitively Impaired Individuals

Few intervention studies have addressed positive affect or mood in elders with AD.[5] The most relevant are 2 studies[6,7] in which recreational activities and pleasant experiences, including walking, were found to be associated with increased positive mood and affect in this group. In a study by Schreiner and colleagues,[6] cognitively impaired nursing home residents were found to express happiness 7 times more often during structured recreation than at other times. Recreation was described as 1-hour sessions of games and songs that fostered "hand-eye coordination, range of motion, respiration and circulation."[6] In a controlled trial with 72 depressed community-dwelling older adults with early to moderate AD, Teri and associates[7] demonstrated a significant decrease in depression levels in subjects exposed to pleasant events including walking. It was unclear to what extent the physical activity or the social interaction associated with these events contributed to producing improved emotional responses.

Exercise and Cognitively Intact Older Adults

Two retrospective studies support a relationship between depressed mood and physical activity in cognitively intact older adults.[8,9] In a study of 1947 community-dwelling adults 50 to 94 years of age (data points 1994 and 1999) from the Alameda County study, Strawbridge and colleagues[8] reported a strong association between reduced physical activity and prevalent and incident depression. According to *DSM*[4] criteria, older adults with low and medium levels of self-reported physical activity were more likely to be depressed than those with high levels of physical activity, odds ratio (OR) = 4.21 and 2.11. In a well-designed Canadian study of 4615 community-dwelling adults age 65 and older, Laurin and associates[9] found a relationship between high levels of self-reported physical activity and reduced risk of cognitive impairment, OR (adjusted for age, sex, and education) = 0.58.

Researchers have reported some improvement following exercise in 4 experimental studies of depressed cognitively intact older adults.[1,10–12] Using a repeated measures, 2-group design, Mather et al[10] compared group exercise (45 minutes of combined endurance, muscle strengthening, and stretching exercise to music twice weekly for 34 weeks) to a health education program in 85 depressed outpatients who had a poor response to antidepressants. Subjects were age 60 and older with Mini-Mental State Examination (MMSE)[13] scores > 26. The exercise group's scores decreased 4.1 points on the Hamilton Rating Scale[14] after 10 weeks and 5.2 points on average after 34 weeks of exercise compared with a 3.7-point decrease in the health education group at 10 weeks and 34 weeks. Although the trend indicated more improvement in the exercise group, the posttest difference between groups was nonsignificant.

Using a convenience sampling strategy, Singh and colleagues[1] identified community-dwelling elders who were at least mildly depressed (Beck Depression Inventory [BDI][15] scores > 12). Individuals who met *DSM* criteria for depression or dysthymia and who scored 23 or greater on the MMSE were randomized to a 10-week program of resistance training. Controls received a health education program. Exercisers' BDI scores decreased 11.5 points on average compared with 4.6 points for controls ($P < .002$).

Pennix and colleagues[11] reported findings from the Fitness, Arthritis, and Seniors Trial including 439 elders with knee osteoarthritis in which the investigators compared aerobic exercise, resistance training, and a health education program over 3 months. When the investigators examined mood outcomes using the Center for Epidemiological Studies Depression Scale (CES-D),[16] they found significantly less depression in the aerobics exercise group.

Only 1 research team examined the effect of exercise on positive moods.[13] Using the Profile of Mood States[17] and Subjective Exercise Experiences Scale,[18] Bartholomew and colleagues[12] examined mood and well-being in 40 older adults diagnosed with major depression before and after exercise. A 2-group repeated-measures design was used in which subjects were randomly assigned to either a single session of moderate-intensity aerobic exercise or a 30-minute period of quiet rest. The investigators found that both treatment groups had reduced negative mood immediately afterward but only the exercise group reported improved mood.

Exercise and Mood in Older Adults With Dementia

The literature contains very few controlled studies of the effect of exercise on affect or mood in cognitively impaired elders. Most studies have addressed depression, and only 1 study included participants with moderate or severe dementia. In a randomized controlled trial, Fiatarone and colleagues[19] studied exercise in mildly impaired elders. Ten weeks of lower extremity resistance exercise 3 days per week was compared with an activity of the subjects' choice (eg, walking, games, discussion groups). Depression scores improved significantly for those in the exercise group.

Teri and colleagues[20] compared 12 hours of exercise training (endurance, strength training, balance, and flexibility) over 12 weeks to routine medical care in community-dwelling persons with moderate AD (mean MMSE score 6.8, SD = 7.1). When compared with usual care, exercise was more effective in reducing depression.

MacRae and associates[21] tested a 12-week exercise program with mildly impaired nursing home residents who scored below the cutoff for depression on the Geriatric Depression Scale (GDS). The investigators found no significant improvement in GDS scores at posttest, but these participants had not been dysphoric at pretest. Molloy and colleagues[22] tested a very brief exercise treatment (two 45-minute sessions of exercise spaced 1 week apart) that had no impact on participants' mood.

Summary

There is growing evidence that exercise is associated with decreased depression in cognitively intact elders. One study found improved mood. Most mood-related research targeting individuals with dementia has focused on depression and dysthymia. More research is needed to address the full spectrum of moods and interventions to produce positive moods in older adults with Alzheimer's disease.[23]

Purpose

The purpose of this study was to examine the change over 16 weeks in affect and mood in nursing home residents with AD who participated in a comprehensive exercise program or a supervised walking program and to compare their outcomes to those receiving an attention control intervention. We hypothesized that participants in the comprehensive exercise group would demonstrate greater improvement in affect and mood than those in the supervised walking program, who, in turn, would demonstrate greater improvement than participants in the social conversation group.

Methods

Design

This study was a 3-group, pretest–posttest design with random assignment to treatment group. Raters were blind to treatment group assignment.

Sample

Eligibility criteria included (1) residence in a long-term care facility; (2) clinical evidence of AD based on the National Institute of Neurological and Communication Disorders and Stroke–Alzheimer's Disease and Related Disorders Association[24]; (3) dependence in at least 1 of the following: bed mobility, transfers, gait or balance; and (4) ability to walk with assistance. Potential participants who walked unaided for 30 minutes or more on their own were excluded. The study was approved by the University of Miami and Florida Atlantic University Institutional Review Boards as well as any participating nursing home that had its own review board. Written consent was obtained from next of kin or legal guardian. Participant assent was determined on an ongoing basis. Residents of 5 long-term care facilities in South Florida were screened by the investigators for eligibility with the assistance of nursing home staff. If a family member or guardian was interested in participating and the resident met initial eligibility criteria, a research team member provided information regarding the study and requested consent.

A total of 135 residents were screened for clinical evidence of AD and consented to participate in the study. Of the 135 residents identified for participation, 19 dropped out because of illness, increased disability, or death prior to pretesting. Twenty-six were unable to complete the study after pretesting and before completion of treatment because of illness, hospitalization, or death attributable to unrelated causes. Ninety participants completed the intervention and posttesting.

Measures

Affect was measured by the Observed Affect Scale (OAS) developed by Lawton and his associates.[25] The OAS was developed to study the quality of life in nursing home residents with dementia and measures 3 positive emotions (pleasure, interest, and contentment) and 3 negative emotions (sadness, anxiety, and anger). An observer rates the frequency of expression first over a 10-minute period of time and then over the last 2 weeks. Interrater reliability scores were satisfactory (0.76–0.89). Validity was supported by comparisons between cognitively impaired and unimpaired long-term care residents. Unimpaired individuals were rated as more anxious. Discriminant validity was evidenced by staff ratings showing that sad and anxious residents were less likely to be rated as showing pleasure and contentment. This scale was selected because it is well suited to this population (based on observations rather than self-report), has acceptable psychometric properties, and measures both positive and negative affect.

Mood was measured using the Dementia Mood Assessment Scale (DMAS)[26] and the Alzheimer's Mood Scale (AMS).[27] The DMAS is a 24-item scale used to rate observable mood and functional abilities on an objective basis. Items 1 through 17 measure mood, whereas the remaining items measure severity of dementia. Only items 1 through 17 were used in this analysis. The mood subscale has a maximum score of 102, with a higher score representing greater dysphoria. Sunderland and his associates[26] reported a mean score of 25.2 in hospitalized patients with clinically diagnosed AD (SD = 9.3). Items are scored on a scale from 1 to 6 with 1 representing *within normal limits* and 6 *the greatest level of severity*. Scores have been found to be significantly correlated with global measures of depression ($r = 0.73$) and sadness ($r = 0.65$). Interrater reliability was tested using intraclass correlation coefficients and found to be highly reliable. This frequently used measure was selected because it was developed specifically for this population and has excellent psychometric properties.

The AMS[27] is a 53-item Likert scale developed from a qualitative study of family and caregiver descriptions of the moods of individuals with AD. Items represent the full range of positive and negative moods. The scale has been tested by the investigators in quantitative studies involving 150 participants with AD. Interrater reliabilities were in the 0.78 to 0.85 range with

raters of same and different ethnic backgrounds. Results on the Positive Emotion subscale correlate well with the 3 positive items of Lawton's OAS[25] ($r = 0.64$) (described below) and negatively ($r = -0.67$) with the 10-item Montgomery-Asberg Depression Rating Scale.[28] Results on the negative subscale correlate substantially with the Montgomery-Asberg ($r = 0.89$) and the negative items of the OAS ($r = 0.88$). This scale was used because it was developed from empirical data, has demonstrated reliability and validity, and measures both positive and negative moods.

Mental status was measured using the MMSE[13] and the 3-trial version of the Fuld Object Memory Evaluation (OME).[29] The MMSE is an 11-item examination measuring cognitive status with a maximum score of 30 points. Validated against clinical diagnosis and the Wechsler Test, the MMSE tests orientation, attention, registration, calculation, recall, and language. High (0.89) test-retest reliabilities have been reported. The OME[29] is a selective reminding test that requires the subject to identify and then recall 10 common household items. During each recall trial, the subject is allowed 60 seconds to recall all of the contents of the bag, is then selectively reminded of those items that were not recalled, and is then administered a distracter task. The sequence of recall trials followed by selective reminding cues interspersed with distracter tasks continues for 3 trials. It yields recall, retention, and recognition scores. The OME has been shown to be sensitive to memory deficits in mildly impaired AD patients. Sensitivity and specificities exceeding 92% for both English- and Spanish-speaking AD patients and normal controls were demonstrated by Loewenstein et al.[29] Excellent specificities have also been found in African American cognitively impaired and intact older adults.[30]

The Six Minute Walk[31] was used as a measure of functional exercise capacity. The test was performed as a free walk and scored as the distance in feet covered in the 6-minute time interval. Distance was measured with a calibrated surveyor's wheel. Interrater reliability and validity of this measure with this population were established previously.[32] Intraclass correlation coefficient (ICC) calculation for intrarater and interrater reliabilities ranged from 0.80 to 0.99 for this measure. Stability over 1 week yielded ICCs of 0.99 for the morning and 0.97 for the afternoon.

Treatment Groups

Treatment was provided to each participant individually 5 days a week (usually consecutive days) for 16 weeks. Thirty participants received comprehensive exercise, 31 received supervised walking, and 29 were assigned to the social conversation group. Participants were tested on all outcome measures prior to initiation of treatment and at the end of the 16 weeks. The duration of all treatment sessions began at 15 minutes for the first 6 weeks, increased to 20 minutes the next 6 weeks, and increased to 30 minutes the last 4 weeks. Sessions were generally conducted indoors on the nursing home units. Participants were randomly assigned to 1 of 3 groups:

Comprehensive exercise group—The exercise protocol included 10 minutes of strength, balance, and flexibility exercises followed by walking. Strength training included shallow knee bends, toe rises, and sitting push-pulls. Balance exercises included side-stepping first to the right, then left, then backward, and finally in circular movements that resembled a dance routine. The number of repetitions was progressed beginning with 3 per exercise and adding 2 repetitions each week up to 9 repetitions. Walking was progressed up to 20 minutes (to yield 30 minutes total intervention time).

Supervised individual walking group—Walking pace was individualized according to the participant's ability. Participants walked at their usual pace and were permitted to rest as needed. Sessions were progressed to increase the pace and distance up to the maximum of 30

minutes. The interventionist used a gait belt and walked beside the participant, lending assistance when needed. If a participant normally used an assistive device such as a walker or cane, he or she continued to use it during the walking sessions.

Social conversation comparison group—The participants in this group were engaged in casual conversation. Conversations occurred in the participant's room or in a nearby quiet room at the nursing home. Participants were encouraged to talk about topics that interested them. They were asked, "How are you today? What would you like to talk about?" Therapeutically oriented interaction including reminiscence and life review was avoided. Sessions began with 15 minutes of conversation and were progressed as tolerated until 30 minutes was reached.

Interventionists

Graduate nursing and physical therapy students trained and supervised by the investigators provided the intervention. Before each session with a participant, interventionists checked with the charge nurse for any health issues that might preclude treatment. They also monitored vital signs before and after each exercise session. Interventionists met with an investigator weekly to problem solve and discuss each participant's progress. On-site visits were made by an investigator every 2 to 3 weeks to observe sessions for quality and consistency.

Adherence Monitoring

Interventionists completed a treatment log after each session. They recorded the participant's vital signs and details of each session, the participant's response, and explanations for any missed sessions. Interventionists also recorded the number of repetitions of each exercise as well as walking, exercise, or conversation time in minutes, the total of which constitutes the treatment intensity measure.

Analysis of the Data

Data were analyzed with SAS statistical software (SAS Institute, Cary, North Carolina). Descriptive statistics, analysis of variance (ANOVA), and chi-square were used to describe the sample and to compare baseline status of participants in the 3 groups. Analysis of covariance (ANCOVA) was used to examine potentially confounding effects of relevant factors such as significant pretest differences in physical ability and treatment intensity. Treatment intensity was measured by the total number of minutes of treatment actually provided over 16 weeks. When *F* ratios were significant, preplanned contrasts were done to compare groups.

Results

Sample Characteristics

Of the 90 participants who met all entry criteria and completed the study, 85% (76) were female and 15% (14) were male. The majority (73 or 81%) spoke English, but 14 (16%) spoke Spanish, and 3 spoke other languages as well as English. Testing was done in both English and Spanish, as were intervention instructions and conversations. Eighty-three percent of subjects were white, non-Hispanic, 16% of subjects were Hispanic, and 1 subject was African American.

The average age of these participants was 88 (SD 6.32) with a range of 71 to 101. Thirty-six (40%) used a walker, 2 used a cane, and 4 used a wheelchair most of the time. MMSE scores ranged from 0 to 28 with a mean of 10.37 (SD 7.60). Forty-four percent of the sample scored in the severely impaired range with MMSE scores between 0 and 9 (n = 40), 42% (n = 38) scored in the moderate range (MMSE = 10–19), 9 individuals were in the mild range (MMSE = 20–23), and 3 individuals scored in the very mild range (MMSE = 24–28). Despite random

assignment to groups, the supervised walking group had a higher mean MMSE score (mean 12.71, SD 7.47) than did the other 2 groups, the comprehensive exercise group (mean 8.50, SD 7.61) and social conversation group (mean 9.82, SD 7.31). These differences were not significant at the $P < .05$ level ($F_{2,89} = 2.54$, $P = .0851$). The OME scores were .91 (1.51) range 0 to 6 for recall, 4.45 (4.03) range 0 to 14 for retention, and 3.53 (3.02) range 0 to 10 for recognition across 3 trials. Pretest recall means for the comprehensive exercise, walking, and conversation groups were 0.93, 1.03, and 0.75, respectively. These differences were also not statistically significant ($F_{2,89} = 0.25$, $P = .7823$). Recognition and retention scores also did not differ significantly across the 3 groups.

Treatment intensity as measured by the total recorded minutes of treatment actually provided differed across groups. Those in the social conversation group received an average of 1484 minutes total treatment time compared with 735 minutes for the comprehensive exercise group and 807 minutes for the supervised walking group. The difference in treatment intensity between groups was significant ($F_{2,87} = 31.50$, $P = .0001$). Engaging the individual in exercise is more challenging than engaging in conversation that does not demand active physical involvement. When compared with conversation, mean treatment intensity was lower in the exercise groups because fatigue or illness was more likely to result in abbreviated or missed exercise sessions. We examined the relationship between treatment intensity and outcomes and found no significant correlations between treatment intensity and posttest scores on any of the outcome variables.

The differences between groups were not significant (α level .05) at pretest on any other of the above-mentioned characteristics when tested using ANOVA for continuous variables or chi-square for categorical or nominal data. Nor did groups differ significantly at pretest on any of the affect or mood outcome measures reported here. There were no significant differences between groups on distance walked at baseline.

Affect, Mood, and Dementia Severity

A pattern was found between the affect and mood measures and cognitive ability at baseline. The strongest relationships were between the MMSE and negative mood as measured by the DMAS and the AMS negative subscale ($r = -0.65$, $P < .0001$, and $r = -0.51$, $P < .0001$, respectively). The relationship with positive mood as measured by the positive sub-scale of the AMS was also relatively strong ($r = 0.46$, $P < .0001$). The relationship with the affect measures was moderate and in the same direction: more positive with higher MMSE scores and more negative as the MMSE scores declined (see Table 1).

Outcomes

Controlling for baseline MMSE score, baseline physical ability as measured by distance walked in 6 minutes, treatment intensity, and the baseline affect or mood score, we conducted a repeated-measures ANCOVA for each of the outcome measures. Where the differences were significant at $P < .05$ or better, preplanned contrasts are also reported. On the majority of outcome measures, the resulting adjusted means are highest on the positive scales and lowest on the negative scales for the comprehensive exercise group. The social conversation group exhibited the highest negative scores and lowest positive scores on all but 1 of the 7 outcome measures. The supervised walking group's adjusted means fell in between on all but 1 of the 7 outcome measures, often closer to the social conversation than to the comprehensive exercise group (see Table 2).

Affect—Two of the 4 subscales of the Lawton OAS evidenced a significant change over time across groups. On the 10-minute OAS, the comprehensive exercise group had a considerably lower negative mean affect score than the supervised walking or social conversation groups.

The difference was significant ($F_{6,89}$ = 2.95, P = .0508). Preplanned contrasts across the 3 groups indicate that the outcome for the comprehensive exercise group was significantly different from the social conversation (P = .0343) and the walking group (P = .0502). The difference between the walking and conversation group outcomes was not significant. The positive subscale evidenced the same pattern but the difference was not significant.

The 2-week OAS negative subscale also evidenced the same pattern but the differences were not significant. The differences in outcome on the positive subscale, however, were significant because the comprehensive exercise group mean was higher than either the supervised walking or the social conversation mean ($F_{6,88}$ = 5.04, P = .0086). Preplanned contrasts across the 3 groups indicate that the differences between the comprehensive exercise and the other 2 groups were significant (P = .0065 with the conversation group and P = .0101 with the walking group), but the difference between the supervised walking and social conversation group was not significant.

Mood—The positive subscale of the AMS showed the same pattern of highest adjusted means for the comprehensive exercise group and lower for the supervised walking and social conversation groups, but the differences were not significant. On the negative subscale, the comprehensive exercise group had the lowest adjusted mean score with the supervised walking group having a somewhat higher mean negative score and the social conversation group having the highest negative score. These differences were significant ($F_{6,88}$ = 4.51, P = .0139). Preplanned contrasts indicate that the difference between the comprehensive exercise group and the social conversation group was significant (P = .0036) as was the difference between the supervised walking group and conversation group (P = .0380) but not between comprehensive exercise group and walking group.

The DMAS results followed the same pattern: the comprehensive exercise group had the lowest (more positive) scores and the social conversation group had the highest (most negative) scores. The supervised walking group fell in between. These differences were significant ($F_{6,89}$ = 4.01, P = .0217). Preplanned contrasts indicate that the difference between the comprehensive exercise and the conversation group was P = .0068. The other comparisons were not significant.

Discussion

Very few studies of the effect of exercise on affect and mood have included individuals with moderate and severe levels of Alzheimer's disease. Only 1 study[21] included nursing home residents with cognitive impairment. Results of studies with intact older adults or those with mild cognitive impairment indicate that exercise could improve mood. Our findings indicated that when compared with social conversation, participation in the comprehensive exercise routine resulted in a pattern of better outcomes in mood and affect. Four of 7 outcomes indicated significant improvement, and the other outcomes, although not significant, were in the same direction. The trend in outcomes for the supervised walking group is not as clear, because the scores fall in between the other 2 groups. The strong negative relationship between mental status and mood indicates the need for further attention to negative mood in later stages of Alzheimer's disease and highlights the need for strategies to maintain or improve positive mood.

Engaging cognitively impaired frail elders in exercise was often a challenge. Fear of falling, deconditioning, and the effects of medications as well as illness and fatigue often resulted in limited treatment time. Although sitting and talking were less demanding for participants, the attention received from interventionists did not result in better mood outcomes.

Participants in the attention control group were engaged in conversations that were casual and did not have a therapeutic intent. In fact, interventionists were reminded not to reminisce, focus on individuals' concerns, or explore issues but rather to converse as a casual friendly visitor would do. Conversations with a therapeutic intent might have had a more positive effect on participants' affect and mood.

The reasons why the comprehensive exercise routine, with its inclusion of balance and flexibility work, was generally superior to walking alone are not clear. Certainly there is more whole-body involvement in the former and less variety of movement in the latter. The comprehensive exercise involved physical contact similar to dancing with a partner. Participants in the walking group who did not need assistance did not necessarily receive any physical contact. The comprehensive exercise was also novel. Walking was not a new or unusual activity, but the push–pulls, backward stepping, and other elements of the comprehensive exercise intervention were outside of the daily routine.

Maintaining positive mood in individuals with advancing AD is important to their already compromised quality of life and well-being.[33] The outcomes of this study have the potential to affect both family and formal caregivers, particularly if they result in fewer behavioral problems in residents. Measures of disturbed behavior were not included in this study but should be included in future research on the effects of exercise in the later stages of AD. Potential physiological responses to the interventions should also be investigated in future studies.

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Table 1

Pearson Product Moment Correlations Between Baseline MMSE, Mood, and Affect

	Correlation, *r*	Significance, *P*
Affect measures		
Lawton OAS 10 min		
Positive	0.39	.0001
Negative	−0.33	.0014
Lawton OAS 2 wk		
Positive	0.29	.0045
Negative	−0.34	.0011
Mood measures		
Alzheimer's Mood Scale		
Positive	0.46	<.0001
Negative	−0.51	<.0001
Dementia mood		
Assessment scale	−0.65	<.0001

Note: MMSE, Mini-Mental State Examination; OAS, Observed Affect Scale.

Table 2

Comparison of Affect and Mood Outcomes Across Treatment Groups

	Comprehensive Exercise	Supervised Walking	Social Conversation
	Posttest adjusted means[a]		
Affect			
Lawton OAS 10 min			
Positive	9.61	8.45	9.08
Negative	2.55	4.11	4.78[b]
Lawton OAS 2 Wk			
Positive	11.11	9.65	9.14[b]
Negative	3.38	4.81	5.65
Mood			
Alzheimer's Mood Scale			
Positive	88.76	80.87	77.20
Negative	46.91	53.04	64.20[b]
Dementia Mood Assessment Scale	19.69	26.49	33.13[b]

Note: OAS, Observed Affect Scale.

[a] Controlled for baseline mood scores, baseline MMSE, distance walked in 6 minutes, and treatment intensity.

[b] $P < .05$.