Behavioral Treatment of Depression in Dementia Patients: A Controlled Clinical Trial

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Depression may be a treatable component of Alzheimer’s disease (AD). Numerous clinical reports attest to the advisability of treating depression in patients with coexistent depression and dementia (Katzman & Jackson, 1991); however, little empirical evidence is available to guide the clinician in the selection of a viable treatment approach. To date, most of the available literature addresses pharmacological treatments (Katzman & Jackson, 1991; Schneider, 1993), despite a growing interest in nonpharmacological treatments.

There are a number of reasons to hypothesize that a nonpharmacological approach to the treatment of patients with depression and dementia may be worthwhile. First, psychoeducational programs have been reported in which caregivers are provided with a broad-based approach to patient management (cf., Zarit, Orr, & Zarit, 1985). Often, behavioral techniques are included in such approaches, and a variety of behavioral problems are addressed. Indeed, one such approach has been found effective in delaying patient institutionalization (Mittelman et al., 1993). Most of these programs, however, have focused on caregiver outcomes, and their effectiveness in reducing patient problems has been understudied (cf., Zarit, 1991; Zarit & Teri, 1991). Second, nonpharmacological behavioral treatments have been shown to be highly effective in reducing depression in younger adults (e.g., Beck, Rush, Shaw, & Emery, 1979; Lewinsohn, Antonuccio, Steinmetz, & Teri, 1984) and in nondemented depressed older adults (Teri, Curtis, Gallagher-Thompson, & Thompson, 1994). Two reports suggest the efficacy of such treatment for demented depressed older adults, as well (Teri & Uomoto, 1991; Teri & Gallagher, 1991). However, research on the application of these approaches in depressed demented adults is lacking. Third, an alternative to traditional pharmacotherapy is needed, especially for patients in whom coexistent medical disease, polypharmacy, high risk for adverse effects, or overriding psychosocial issues makes pharmacological approaches problematic. Thus, nonpharmacological treatment may provide a reasonable alternative or adjunct to pharmacotherapy.

The current study evaluated two behavioral approaches to the treatment of depression in patients with AD. Each treatment was designed to teach caregivers behavioral strategies to alleviate patient depression. Each was based, in part, on the assumptions that (1) caregivers are often directly responsible for patient activity on a daily basis, and (2) caregiver-patient interactions are important factors in the establishment and maintenance of patient mood. (These assumptions and their role in caregiver education and patient care are discussed in greater detail in Teri, Curtis, et al., 1994.) One program emphasized increasing patient pleasant events and positive interactions. This program was formulated on behavioral theory and therapy of depression in nondepressed adults, in which pleasant events have been found to be significantly associated with depressed mood (Lewinsohn et al., 1984). The utility of this program to dementia patients has been demonstrated in case reports (Teri & Gallagher, 1991; Teri & Uomoto, 1991) but not subjected to a rigorous controlled trial. The other program focused on training caregivers in effective problem-solving techniques. It emphasized more of an active and flexible problem-solving approach by incorporating more caregiver input into the development of treatment strategies and goals. Both programs employed behavioral change strategies for effective problem management.

Treatment was hypothesized to decrease the level of depression symptoms in depressed AD patients since patients with coexistent depression and dementia have more depression symptoms than nondepressed dementia patients (Teri, Baer, & Reifler, 1991). Treatment was not hypothesized to affect caregivers because the focus of treatment was the patient. Caregiver depression and burden were assessed, however, to determine whether they were affected by treatment and whether they affected patient outcome, since caregivers of dementia patients are likely to have higher than...
normal levels of stress and burden and report higher levels of depression themselves (Pearson, Teri, Wagner, Truax, & Logsdon, 1993; Russo, Vitaliano, Brewer, Katon, & Becker, 1995; Schultz, O’Brien, Bookwala, & Fleissner, 1995).

To systematically evaluate the effectiveness of these treatments, a controlled clinical trial was conducted in which these conditions were compared with an equal-duration typical care intervention and a wait list control condition. Patients and caregivers were randomly assigned to one of the four conditions and assessed at pre-, post-, and 6-month follow-up intervals by interviewers blind to treatment assignment.

**METHOD**

**Procedures.** — Patients with dementia and their caregivers were recruited from referrals from the University of Washington Medical Center (UWMC) Geriatric & Family Services Clinic and the UWMC Alzheimer’s Disease Research Center. To be eligible for study inclusion, all patient-subjects had to meet NINCDS-ADRDA criteria for probable AD (McKann et al., 1984), have at least a 6-month history of cognitive problems, and live with their caregivers in the community. They also had to meet Research Diagnostic Criteria (RDC) and Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R) criteria for major or minor depressive disorder (not including the exclusionary criteria for dementia) and have a Hamilton Depression Rating Scale score of at least 10.

The diagnosis of dementia was based on a thorough physical and neurological exam and confirmed by neuropsychological assessment of the patient and diagnostic information obtained during detailed interviews with the patient and caregiver. (These diagnostic procedures are described in detail elsewhere [Larson et al., 1990; Reiffer, Larson, & Teri, 1997].)

The diagnosis of depression was based on extensive interviews of both patient and caregiver. Caregivers were interviewed using the Schedule for Affective Disorders and Schizophrenia (SADS; Endicott & Spitzer, 1978) to provide information about the patient’s depressive symptoms and classified according to RDC (Endicott, & Robins, 1978) and DSM III-R criteria (American Psychiatric Association, 1987). Interviews were conducted by experienced master’s- and PhD-level clinical geriatric interviewers, blind to treatment condition. Interrater reliability was assessed by independent ratings of videotapes by experts (R. Logsdon or L. Teri). There was 100% agreement between expert and interviewer on the diagnosis of depression. Subjects were randomly assigned to one of four treatment conditions: behavior therapy-pleasant events (BT-PE); behavior therapy-problem solving (BT-PS); typical care control (TCC); and wait list control (WLC). The focus and content of each of these conditions are described below.

**Subjects.** — Fifty-four (75%) patient-subjects were diagnosed with major depressive disorder and 18 (25%) were diagnosed with minor depressive disorder. Eighty-eight patient-caregiver pairs began the study; 72 (82%) completed the pretest, 9-week intervention, and posttest. Subjects who discontinued treatment did so for the following reasons: serious medical illness (n = 4), change in living situation (n = 4), exclusionary medication prescribed during the intervention stage (n = 2), and caregiver stopped participating (n = 6). No significant differences were obtained on baseline measures between subjects who did and did not discontinue treatment.

**Measures**

Since there is some controversy about the best way to measure depression in a dementia subject, we measured depression using both caregiver report and clinical interview data. (For a more detailed discussion of the issues assessment of depression in dementia, the reader is referred to Teri & Wagner, 1992.) The two primary outcome measures of patient depression were the Hamilton Depression Rating Scale (HDRS; Hamilton, 1960, 1967), and the Cornell Scale for Depression in Dementia (CSDD; Alexopoulos, Abrams, Young, & Shamoian, 1988). The HDRS score was extracted from the SADS interview, using the standard algorithm shown to be reliable and consistent with the original HDRS (Endicott, Cohen, Nee, Fleiss, & Sarantakos, 1981; Rapp, Smith, & Britt, 1990). The CSDD was completed based on interviews with both the caregiver and patient. It is a 19-item, 38-point interviewer-rated scale of depressive symptoms especially designed for assessing depression in dementia patients and has good interrater reliability, internal consistency, and validity (Alexopoulos et al., 1988). As a secondary depression outcome measure, the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) was completed by caregivers about their patients’ depressive symptoms. The BDI is a 21-item, 63-point self-report questionnaire of depressive symptoms presented in multiple choice format. It was developed for use with adults and has been shown to be reliable and valid with nondemented older adults (Gallagher, Nies, & Thompson, 1982; Gallagher, Breckenridge, Steinmetz, & Thompson, 1983). The BDI was modified for this investigation to make it appropriate for use by caregivers to report on the patients’ symptoms. Modifications consisted of simple word changes. For example, the item that normally reads “I ... cry all the time now” was changed to “The patient ... cries all the time now.” This modified questionnaire has been found to be a reliable and valid assessment of patient depressive symptoms (Logsdon & Teri, 1995).

To assess patient cognition and function, the Mini-Mental State Exam (MMSE; Folstein, Folstein, & McHugh, 1975), the Dementia Rating Scale (DRS; Cobletz et al., 1973; Mattis, 1989) and the Record of Independent Living (RIL; Weintraub, Baratz, & Mesulam, 1982) were administered. The MMSE yields a total of 30 points and has been widely used in both clinical and research studies. The DRS yields a total score (0–144) and five subscale scores: attention, initiation and perseveration, construction, conceptualization, and memory. The RIL yields a total score (0–76) and assesses activities of daily living (such as dressing, bathing, and toileting), independent activities of daily living (such as driving, shopping, and household upkeep), and...
communication (such as using the telephone, talking, and writing). All measures have been shown to have good discriminating validity between normal and cognitively impaired groups, good overall reliability, and a strong correlation with overall patient functioning (Fitz & Teri, 1994; Vitaliano, Russo, Breen, Vitiello, & Prinz, 1986).

Caregiver depression was assessed by interviewing caregivers about their own symptoms on the SADS. A depression diagnosis was determined using RDC. An HDRS score for caregivers was extracted from the SADS using the same procedure as described for the patients.

The Burden Inventory (BI; Zarit, Reever, & Bach-Peterson, 1980) assessed caregivers' subjective assessments of the negative impact of caregiving on their emotional and physical health, social life, and financial status. The BI consists of 22 items on which the caregiver is asked to rate his or her feelings about caring for the patient. Scores range from 0 to 88, with higher scores signifying higher levels of burden. The BI has been demonstrated to have good internal consistency, content validity, and test-retest reliability (Young and Kahana, 1989).

Positive aspects of caregiving were also assessed by asking caregivers to respond to 10 items regarding benefits they may have experienced as a result of caregiving. For example, caregivers were asked to rate how often they felt that caring for the patient had strengthened their relationship, how often they shared pleasurable experiences with the patient, and how often they felt that caring for the patient gave them a sense of purpose or meaning. Scores on these questions range from 0 to 34 with higher scores indicating more positive reporting.

**Treatment Conditions**

Behavior Therapy-Pleasant Events (BT-PE). — A series of articles describes this intervention (Teri, 1991, 1994; Teri, Logsdon, Wagner, & Uomoto, 1994). A complete therapist manual and caregiver reader is also available. The specific focus of treatment was to teach caregivers behavioral strategies for improving patient depression by increasing pleasant events and using behavioral problem-solving strategies to alter the contingencies that relate to depression and associated behavior problems. Different from many other caregiver-based interventions, this approach purposely included the patient and focused on altering the patient’s depressive behavior by teaching the caregiver to implement specific behavioral techniques.

Treatment consisted of nine 60-minute sessions, once per week, with patients and caregivers participating in varying degrees. Caregivers rated the patient’s mood and monitored the frequency and duration of pleasant events each day throughout treatment. They also monitored changes in depression as they implemented behavior management strategies. The first session was introductory, describing the rationale to behavioral intervention for depression in dementia, the depressive cycle, and the importance of pleasant events. The next four sessions focused on identifying, planning, and increasing pleasant events for the patient. The Pleasant Events Schedule-AD (PES-AD, Teri & Logsdon, 1991) was used throughout therapy to generate ideas and help plan pleasant activities. Beginning in the fifth session, caregiver problems such as depression, stress, anger, and burden were addressed. Caregivers were encouraged to plan pleasant events for themselves and to develop a support system to assist with the patient’s care. The next three sessions covered strategies for identifying and confronting behavioral disturbances that interfered with engaging in pleasant activities. This included identifying specific behavior problems, observing antecedents and consequences of these difficulties, and devising problem-solving strategies for modifying problem behaviors. The final session summarized treatment and focused on developing plans for continuing pleasant events and problem solving.

Behavior Therapy-Problem-solving (BT-PS). — This condition was designed to be more flexible than BT-PE by allowing caregivers more input into the content and flow of treatment. It did not have the focus of identifying and carrying out pleasant activities, although this was included as appropriate. Therapists utilized a systematic approach to problem-solving situations of concern. They also provided education, advice, and support to caregivers. BT-PS focused on problem-solving patient depression behaviors of specific concern to caregivers.

Typical Care Control (TCC). — A typical care control was established to determine whether improvements would be obtained on patients and caregivers receiving the typical advice and support provided in services typically available in the community. Subjects in this condition were given information, advice, and support with their efforts to manage patient problems. No specified homework assignments or record keeping were provided. Specific problem solving or behavioral strategies were not implemented. Therapists gave suggestions and advice of an unstructured nature. The duration of time was equal to that of BT-PE and BT-PS (60-minute sessions for 9 weeks).

Wait List Control (WLC). — The wait list control condition was of equal duration with the three conditions just described. Subjects in this condition received no contact with therapists. Following assignment, they were informed that they would receive no active intervention during the 9-week period. Immediately following the 9 weeks, they were posttested.

Both control conditions were in keeping with the recommendations of Klerman (1983) and Parloff (1986) that treatment comparison studies should establish such controls to allow observation of the natural course of the disease for a brief interval and enable determination of whether patients in the active condition improved more than patients receiving regular treatment contact (TCC) or obtaining no active intervention (WLC).

**Therapists**

The amount of therapist contact and the number and length of sessions was the same for all conditions except the WLC, in which there was no contact. Therapists were all experienced geriatricians, hired from the community and academic medical center especially for this study. Thera-
pists were matched to ensure that level of training and experience of therapists across conditions were comparable. Investigators met with therapists on a regular basis to ensure that therapists followed the appropriate protocol and dealt appropriately with any emergencies or problems that arose during treatment.

Statistical Analysis
Descriptive statistics were obtained on the demographic and pretest characteristics of subjects in each of the four treatment conditions. Differences on these variables were examined using either chi-square tests or analysis of variance. To test the hypotheses of treatment-related differences among the BT-PE, BT-PS, TCC, and WLC groups, multivariate analyses of variance were used to compare changes in outcome measure scores from pretreatment to posttreatment. Using the multivariate analysis of variance (MANOVA) approach to testing repeated measures designs has the advantage of being free of the sphericity assumptions required in traditional repeated measures analysis, and is recommended by O'Brien and Kaiser (1985) as being straightforward, powerful, and appropriate to treatment outcome investigations. In addition to providing a multivariate analysis of the effect of treatment on the combined changes in all measures of a specific construct (e.g., on all depression measures), this approach also provides a univariate analysis of the effect of treatment on each measure, thus allowing an investigation of which measures were most affected by treatment. Separate MANOVAs were conducted for measures of patient depression, cognition, behavior problems, and function, and for caregiver depression and burden. For those measures that were demonstrated to change significantly as a result of treatment, a post hoc analysis using orthogonal contrasts was conducted to determine whether BT-PE and BT-PS conditions differed significantly from the TCC, WLC, and/or from each other. To correct for inflated Type I error due to multiple comparisons, the Newman-Keuls test for pairwise comparisons (Winer, 1971) was used, with the critical value set at \( p = .05 \). Finally, to determine whether any patient or caregiver variables predicted improvement, a logistic regression was conducted to examine the impact of demographic characteristics, caregiver variables, and pretreatment characteristics of patient-subjects on improvement in the patient's depression diagnosis.

RESULTS
Table 1 summarizes the demographic characteristics and pretreatment scores on outcome measures for subjects in each treatment condition. No significant demographic differences were found among subjects across the four treatment conditions, with the exceptions of gender [patients: \( \chi^2(3, N = 72) = 9.79, p < .05 \); caregivers: \( \chi^2(3, N = 72) = 10.80, p < .01 \)]. More female patients were in BT-PE and TCC than BT-PS or WLC. More male caregivers were in BT-PE than in any of the other conditions. No differences in caregiver-patient relationship were found across the treatment conditions. Patients in the four treatment conditions did not significantly differ on any pretreatment depression scores, nor were they different on cognition, behavior problems, or functional status. Caregivers also did not significantly differ on the HDRS or on depression diagnosis.

Table 2 provides the change scores from pre- to posttreatment on all variables of interest. These change scores were computed by subtracting the pretreatment score on each measure from the posttreatment score (O'Brien & Kaiser, 1985). Thus, change scores represent the amount of change that occurred on each measure following treatment. On all measures, higher scores indicate greater severity of problems and negative change scores indicate improvement from pre- to posttreatment. Differences among treatment conditions on these change scores were analyzed using a MANOVA, as described earlier. Because patient and caregiver gender were found to be significantly different among treatment conditions at pretreatment, these variables were entered into the analysis as covariates to ensure that differences would reflect true treatment effects rather than artifacts of gender. No significant main effect for gender nor any significant Gender X Treatment interactions were obtained. Thus, gender was not significantly associated with treatment outcome.

A significant overall treatment effect was obtained for patient depression \( F(3,71) = 4.52, p < .001 \). Effect sizes for the HDRS and the CSD were large \((d=0.9-1.7; Cohen, 1969)\) for both treatment groups, as was the effect size for the BDI in the BT-PS group \((d=1.0)\). In the BT-PE group the effect size was small \((d=0.4)\). Univariate results indicated significant differences on change scores between treatment conditions for all patient depression measures: the HDRS \( F(3,66) = 11.04, p < .001 \), the CSDD \( F(3,66) = 7.84, p < .001 \), and the BDI \( F(3,66) = 3.74, p < .01 \). Post hoc analyses indicated that subjects in the two active treatment conditions (BT-PE and BT-PS) did not differ significantly from one another, but that each active treatment resulted in significant improvement as compared with the two control conditions (TCC and WLC). Further, the TCC and WLC conditions were not significantly different from one another. No significant differences were found on measures of patient cognition or functional status, as expected.

For caregivers, no significant changes were hypothesized, since the focus of intervention was the patient. Unexpectedly, as shown in Table 2, an overall treatment effect was found for caregiver depression on the HDRS \( F(3,66) = 4.73, p < .01 \). Post hoc analysis revealed that BT-PE and BT-PS caregivers did not significantly differ from one another, but caregivers in the active conditions improved significantly more than caregivers in the control conditions.

Improvers vs Nonimprovers
The clinical significance of change in test scores was also examined. It is important to consider improvement from a clinical, as well as a statistical, perspective to ensure that statistically significant treatment effects were meaningful from the standpoint of improving the patient's life in some way. Several approaches have been suggested to identify clinically significant improvement (Jacobson & Truax, 1991; Steketee & Chambless, 1992). For purposes of this investigation, subjects who met criteria for major depression at pretreatment and no longer met major depression criteria following treatment were considered to have
Table 1. Demographic Characteristics and Baseline Scores

<table>
<thead>
<tr>
<th></th>
<th>BT-PE (N = 23)</th>
<th>BT-PS (N = 19)</th>
<th>TCC (N = 10)</th>
<th>WLC (N = 20)</th>
<th>Total (N = 72)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient</strong></td>
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<tr>
<td>Age</td>
<td>72.8 ± 8.2</td>
<td>78.5 ± 7.9</td>
<td>79.5 ± 6.9</td>
<td>76.8 ± 8.2</td>
<td>76.4 ± 8.2</td>
</tr>
<tr>
<td>Education</td>
<td>14.2 ± 2.9</td>
<td>14.2 ± 3.0</td>
<td>14.0 ± 2.3</td>
<td>14.0 ± 3.0</td>
<td>14.1 ± 2.9</td>
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<tr>
<td>Gender*</td>
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<tr>
<td>Female</td>
<td>16 (70%)</td>
<td>5 (26%)</td>
<td>6 (60%)</td>
<td>7 (35%)</td>
<td>34 (47%)</td>
</tr>
<tr>
<td>Male</td>
<td>7 (30%)</td>
<td>14 (74%)</td>
<td>4 (40%)</td>
<td>13 (65%)</td>
<td>38 (53%)</td>
</tr>
<tr>
<td><strong>Dementia duration (mo)</strong></td>
<td>39.7 ± 21.6</td>
<td>35.1 ± 24.6</td>
<td>34.4 ± 27.4</td>
<td>31.8 ± 26.2</td>
<td>35.6 ± 24.2</td>
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<tr>
<td><strong>Depression diagnosis</strong></td>
<td></td>
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<tr>
<td>Major</td>
<td>17 (74%)</td>
<td>17 (89.5%)</td>
<td>5 (50%)</td>
<td>15 (75%)</td>
<td>54 (75%)</td>
</tr>
<tr>
<td>Minor</td>
<td>6 (26%)</td>
<td>2 (10.5%)</td>
<td>5 (50%)</td>
<td>5 (25%)</td>
<td>18 (25%)</td>
</tr>
<tr>
<td><strong>Depression duration (mo)</strong></td>
<td>16.7 ± 15.3</td>
<td>22.4 ± 19.0</td>
<td>23.2 ± 23.7</td>
<td>17.5 ± 14.6</td>
<td>19.4 ± 17.4</td>
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<tr>
<td><strong>Living situation</strong></td>
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<tr>
<td>Private home</td>
<td>19 (83%)</td>
<td>16 (84%)</td>
<td>9 (90%)</td>
<td>18 (90%)</td>
<td>61 (86%)</td>
</tr>
<tr>
<td>Retirement home</td>
<td>3 (13%)</td>
<td>1 (5%)</td>
<td>0</td>
<td>0</td>
<td>4 (6%)</td>
</tr>
<tr>
<td>Adult group home</td>
<td>1 (4%)</td>
<td>2 (11%)</td>
<td>1 (10%)</td>
<td>2 (10%)</td>
<td>6 (8%)</td>
</tr>
<tr>
<td>MMSE</td>
<td>15.8 ± 7.8</td>
<td>15.7 ± 7.4</td>
<td>16.8 ± 5.4</td>
<td>17.9 ± 7.9</td>
<td>16.5 ± 7.4</td>
</tr>
<tr>
<td><strong>DRS</strong></td>
<td>105.8 ± 30.7</td>
<td>106.8 ± 24.2</td>
<td>111.2 ± 14.5</td>
<td>112.1 ± 22.0</td>
<td>108.6 ± 24.7</td>
</tr>
<tr>
<td><strong>HDRS</strong></td>
<td>16.3 ± 5.3</td>
<td>16.0 ± 4.0</td>
<td>14.1 ± 4.0</td>
<td>14.5 ± 3.5</td>
<td>15.4 ± 4.4</td>
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<tr>
<td><strong>CSDD</strong></td>
<td>14.8 ± 4.2</td>
<td>15.1 ± 3.5</td>
<td>13.9 ± 4.6</td>
<td>14.0 ± 4.2</td>
<td>14.6 ± 4.0</td>
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<tr>
<td><strong>BDI</strong></td>
<td>15.5 ± 7.1</td>
<td>21.7 ± 7.9</td>
<td>17.9 ± 9.2</td>
<td>17.1 ± 8.4</td>
<td>17.9 ± 8.2</td>
</tr>
<tr>
<td><strong>Caregiver</strong></td>
<td></td>
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</tr>
<tr>
<td>Age</td>
<td>67.3 ± 12.0</td>
<td>64.6 ± 11.6</td>
<td>66.3 ± 13.0</td>
<td>68.7 ± 8.5</td>
<td>66.9 ± 11.0</td>
</tr>
<tr>
<td>Education</td>
<td>14.4 ± 3.4</td>
<td>14.2 ± 2.1</td>
<td>14.3 ± 1.8</td>
<td>13.9 ± 2.5</td>
<td>14.2 ± 2.7</td>
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<tr>
<td>Gender**</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Female</td>
<td>11 (48%)</td>
<td>18 (95%)</td>
<td>7 (70%)</td>
<td>14 (70%)</td>
<td>50 (69%)</td>
</tr>
<tr>
<td>Male</td>
<td>12 (52%)</td>
<td>1 (5%)</td>
<td>3 (30%)</td>
<td>6 (30%)</td>
<td>22 (31%)</td>
</tr>
<tr>
<td><strong>Relationship</strong></td>
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<tr>
<td>Spouse</td>
<td>18 (78%)</td>
<td>14 (74%)</td>
<td>7 (70%)</td>
<td>18 (90%)</td>
<td>56 (79%)</td>
</tr>
<tr>
<td>Adult child</td>
<td>4 (17%)</td>
<td>4 (21%)</td>
<td>2 (20%)</td>
<td>0</td>
<td>10 (14%)</td>
</tr>
<tr>
<td>Close friend</td>
<td>1 (4%)</td>
<td>1 (5%)</td>
<td>1 (10%)</td>
<td>2 (10%)</td>
<td>5 (7%)</td>
</tr>
<tr>
<td><strong>Depression diagnosis</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Major</td>
<td>5 (22%)</td>
<td>3 (16%)</td>
<td>2 (20%)</td>
<td>0</td>
<td>10 (14%)</td>
</tr>
<tr>
<td>Minor</td>
<td>11 (48%)</td>
<td>14 (74%)</td>
<td>5 (50%)</td>
<td>15 (75%)</td>
<td>45 (62%)</td>
</tr>
<tr>
<td>Not depressed</td>
<td>7 (30%)</td>
<td>2 (20%)</td>
<td>3 (20%)</td>
<td>5 (25%)</td>
<td>17 (24%)</td>
</tr>
<tr>
<td><strong>HDRS</strong></td>
<td>8.0 ± 5.1</td>
<td>9.0 ± 3.6</td>
<td>6.7 ± 4.6</td>
<td>6.0 ± 2.0</td>
<td>6.4 ± 3.4</td>
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<tr>
<td><strong>Burden</strong></td>
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<tr>
<td>Positive</td>
<td>25.8 ± 6.2</td>
<td>23.3 ± 6.6</td>
<td>19.8 ± 8.5</td>
<td>22.5 ± 6.6</td>
<td>23.4 ± 7.5</td>
</tr>
<tr>
<td>Negative*</td>
<td>33.3 ± 10.0</td>
<td>48.2 ± 15.5</td>
<td>44.3 ± 15.5</td>
<td>40.9 ± 17.1</td>
<td>40.8 ± 15.9</td>
</tr>
</tbody>
</table>

*Note: BT-PE = behavior therapy-pleasant events; BT-PS = behavior therapy-problem solving; TCC = typical care control; WLC = wait list control; MMSE = Mini-Mental State Exam; DRS = Dementia Rating Scale; HDRS = Hamilton Depression Rating Scale; CSDD = Cornell Scale for Depression in Dementia; BDI = Beck Depression Inventory.

*p < .05, **p < .01.

Table 2. Changes in Outcome Measure Scores from Pre- to Posttreatment

<table>
<thead>
<tr>
<th></th>
<th>BT-PE (N = 23)</th>
<th>BT-PS (N = 19)</th>
<th>TCC (N = 10)</th>
<th>WLC (N = 20)</th>
</tr>
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<tbody>
<tr>
<td><strong>Patient Depression Measures</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>HDRS</td>
<td>-5.3 ± 4.0</td>
<td>-3.8 ± 2.3</td>
<td>-0.3 ± 4.7</td>
<td>0.3 ± 3.5***</td>
</tr>
<tr>
<td>CSDD</td>
<td>-4.2 ± 4.5</td>
<td>-3.7 ± 3.8</td>
<td>0.0 ± 2.0</td>
<td>0.1 ± 3.5***</td>
</tr>
<tr>
<td>BDI</td>
<td>-1.3 ± 6.3</td>
<td>-4.5 ± 4.5</td>
<td>1.9 ± 5.8</td>
<td>0.5 ± 4.6**</td>
</tr>
<tr>
<td><strong>Cognition Measures</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>MMSE</td>
<td>-0.9 ± 3.1</td>
<td>-1.0 ± 2.9</td>
<td>0.1 ± 4.1</td>
<td>-0.7 ± 3.6</td>
</tr>
<tr>
<td>DRS</td>
<td>-5.0 ± 11.9</td>
<td>-1.3 ± 8.2</td>
<td>2.6 ± 15.3</td>
<td>3.6 ± 6.3</td>
</tr>
<tr>
<td><strong>Caregiver Depression Measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HDRS</td>
<td>-1.7 ± 4.5</td>
<td>-3.2 ± 3.3</td>
<td>0.6 ± 3.5</td>
<td>0.6 ± 2.5**</td>
</tr>
<tr>
<td>Burden</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive burden</td>
<td>-1.3 ± 5.2</td>
<td>0.4 ± 6.7</td>
<td>1.6 ± 6.3</td>
<td>-0.6 ± 3.7</td>
</tr>
<tr>
<td>Negative burden</td>
<td>-0.2 ± 8.3</td>
<td>-6.8 ± 14.4</td>
<td>-2.0 ± 8.0</td>
<td>-0.4 ± 7.8</td>
</tr>
</tbody>
</table>

*Note: BT-PE = behavior therapy-pleasant events; BT-PS = behavior therapy-problem solving; TCC = typical care control; WLC = wait list control; MMSE = Mini-Mental State Exam; DRS = Dementia Rating Scale; HDRS = Hamilton Depression Rating Scale; CSDD = Cornell Scale for Depression in Dementia; BDI = Beck Depression Inventory.

*p < .05; **p < .01; ***p < .005; ****p < .0001.
experienced clinically significant improvement. Subjects who met criteria for minor depression at pretreatment were considered significantly clinically improved if they no longer met criteria for minor or major depression after treatment. Results of this analysis are shown in Table 3.

Using the definition above, 25 subjects [60%; 95% CI = (.45, .74)] in the active treatment conditions showed clinically significant improvement, while only 6 subjects [20%; 95% CI = (.06, .34)] in the TCC or WLC conditions showed improvement. Of the 21 subjects in the control conditions, 9 (70%) showed no change in diagnosis, and 3 subjects (10%) worsened. No subject in active treatment worsened [χ² (6, N = 72) = 18.48, p < .005].

To clarify whether demographic or baseline characteristics of patients or caregivers predicted patient improvement, pretest scores on patient variables (age, education, gender, duration of depression, duration of dementia, MMSE score, depression diagnosis, and HDRS score), and caregiver variables (age, education, relationship to the patient, and HDRS score) were examined in a series of univariate logistical regression analyses between improvers and nonimprovers in the active treatment conditions. The only significant predictor of improvement in patient depression diagnosis was pretreatment depression diagnosis (p < .01). All improvers were diagnosed with major depression prior to treatment (100%), while nonimprovers consisted of 9 patients (53%) with major depression and 8 patients (47%) with minor depression. Among those patients diagnosed with major depression at pretreatment, 75% showed significant clinical improvement following treatment.

**Symptom Pattern Alterations**

Specific symptoms that changed as a result of treatment were also examined. Major depression symptoms that were most likely to be eliminated, and the percent of patients who had the symptom at baseline but no longer had the symptom after treatment were as follows: appetite or weight change (66%), thoughts of death or suicide (64%), loss of interest (54%), sleep disturbance (43%), dysphoria (40%), guilt feelings (29%), psychomotor agitation or retardation (17%), and fatigue (15%). Difficulty concentrating or making decisions was present for almost all subjects (93%) and did not change as a result of treatment. This is consistent with expectations of behavioral treatment for AD patients: behaviors associated with depression were hypothesized to improve, cognitive symptoms were not. Minor depression symptoms showing improvement and the percent of patients for whom the symptom was eliminated following treatment were as follows: pessimism (47%), physical complaints (46%), feeling inadequate (40%), brooding (33%), and feeling sorry for oneself (17%). Symptoms that did not change included feeling resentful, crying, and needing help and reassurance.

**Six-Month Follow-Up**

Six-month follow-up data were collected on subjects who participated in the active treatment conditions (BT-PE and BT-PS). Subjects in control conditions did not receive follow-up assessments because ethical considerations required that they be offered treatment as soon as possible after the end of the control periods. Thus, 42 caregiver-subject patient pairs were eligible for follow-up. Of these, data were obtained on 32 (78%).

Those who did not receive follow-up included 6 subjects who had moved out of the area and were unavailable for testing and 4 subjects who had been placed in nursing homes due to cognitive or physical decline. There was no significant difference between conditions in the number of subjects completing follow-up.

Table 4 shows the pre- and posttreatment and follow-up scores on primary outcome measures for patient and caregiver subjects. There were no significant differences between treatment conditions at either posttest or follow-up, so they were combined to provide a larger sample size for analysis of follow-up data. A repeated measures MANOVA was used to compare scores across time.

Both patients and caregivers maintained significant improvement over pretest scores at 6 months (patient HDRS [F(60,2) = 31.47, p < .001]; patient CSDD [F(60,2) = 16.93, p < .001]; caregiver HDRS [F(60,2) = 4.28, p < .05]). These findings can be seen in each condition separately and combined. As expected, patient MMSE scores showed a significant decline at 6 months, as compared with pretest [F(60,2) = 8.67, p < .001].

The clinical significance of these change scores was evaluated by examining depression diagnosis at 6-month follow-up as compared with posttreatment, using the same definition of improvement used earlier. Twenty-two subjects (69%) maintained their improvement or improved further, while 10 (31%) relapsed during the 6-month follow-up period. Again, there was no significant difference between the two active treatments.

**DISCUSSION**

The results of this study support the effectiveness of behavioral treatment of depression in patients with AD. Pa-
tients and caregivers receiving behavioral treatment with either a pleasant event or problem-solving focus demonstrated significant reductions in their level of depression following treatment, and those reductions were maintained at follow-up. Patients and caregivers receiving behavioral treatment improved significantly more than those receiving an equal duration typical care or wait list control. Further, the level of improvement was comparable to that obtained in one published controlled clinical trial of antidepressant medication for these patients (Reifler et al., 1989).

Patients with major depressive disorder, who were experiencing symptoms of dysphoria, loss of interest, suicidal ideation, appetite change, and sleep disturbance, were most likely to benefit from treatment. Those experiencing predominantly dementia-related symptoms, such as difficulty concentrating, were less likely to show improvement. This finding is consistent with the content of the behaviorally focused treatment as well as with the nature of cognitive impairment in AD. Depression symptoms were hypothesized to improve; cognitive symptoms were not. The support of these hypotheses highlights the importance of realistic expectations when treating these patients.

Behavioral treatment significantly reduced caregiver depression as well. Caregivers who participated in behavioral treatment had significantly lower posttest scores on the HDRS compared with caregivers in either control condition. Thus, in addition to improving patient depression, behavioral treatment improved caregiver depression. This was contrary to our initial expectations and is particularly promising given that (1) there was a high proportion of caregivers with clinically significant depression in this sample, (2) these caregivers were not seeking help for themselves, and (3) treatment was not targeted to the caregiver, but rather trained the caregiver to aid the patient. Increased skill in patient management, the availability of regular therapeutic support, and reduced depression in their family member may explain these positive caregiver results.

While the overall level of patient improvement posttreatment was statistically and clinically significant, one must raise the question of why a stronger level of change was not achieved. A number of reasons are possible and merit continued research. First, the assessment of depression in patients with dementia is not yet perfected. Although clear advances in recent years have been made, as attested by the development of specialized instruments (Alexopoulos et al., 1988; Logsdon & Teri, 1995), there is still considerable overlap between dementia and depression symptomatology. It is unrealistic to expect any depression intervention, whether pharmacological or nonpharmacological, to successfully impact symptoms that are entirely caused by a progressive dementia, such as AD. Second, the factors influencing successful treatment outcome are likely to be multifactorial. Further exploration of these factors is needed. Incorporating components that target some of the broader factors known to influence effective care, such as patient and caregiver physical health or family and social supports, may enhance treatment. Expanding the duration and content of treatment may also result in a stronger treatment effect. Combining nonpharmacological and pharmacological treatment may offer an even stronger treatment impact for these patients. Future research is needed to evaluate these hypotheses.

Interventions for patients not represented in the current sample are also needed. Quite obviously, caregivers are essential to (and benefit from) the behavioral interventions described here. Interventions for patients without family caregivers are needed. The treatments described here require that patients have an involved, cognitively intact care provider to help organize their days and activities. The exact nature of this care provider, however, can be expanded from the family members included here and may offer great potential for home health aides, foster care providers, day care, and nursing home staff. Patients in this study were also community-residing, moderately depressed patients with moderate levels of cognitive impairment.

Controlled empirical investigations of nonpharmacological and pharmacological interventions for institutionalized, severely depressed, more advanced AD patients are needed as well.

In conclusion, this study evaluated the effectiveness of behavioral treatment for depression in patients with AD. It was hypothesized that such treatment would successfully impact the symptoms of depression in AD patients. The results obtained here support these hypotheses and further suggest such treatment is effective in alleviating depression in participating caregivers. Therefore, nonpharmacological approaches, such as the behavioral interventions evaluated here, should be added to the clinical repertoire of those treating depressed demented patients and their caregivers.

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Correspondence concerning this article and/or requests for the complete therapist manual and caregiver reader mentioned in the text under “Treatment Conditions” should be sent to Dr. Linda Teri, Department of Psychiatry and Behavioral Sciences, Box 35650, University of Washington, Seattle, WA 98195-6560.

REFERENCES


Teri, L., & Logsdon, R. (1991). Identifying pleasant activities for individu-


Young, R. F., & Kahana, E. (1989). Specifying caregiver outcomes: Gen-


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