Impact of Underlying Depression on Treatment of Neuropsychiatric Symptoms in Older Adults with Dementia

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Abstract:

This article examines the moderating effect of depression on interdisciplinary treatment approaches for behaviors in dementia. A secondary analysis of data collected on tailored treatment of 105 long-term care residents with dementia found a significant relationship between treatment and passivity ($p < 0.001$), treatment and agitation ($p = 0.001$), and the mediating effect of change in passivity on change in agitation ($p < 0.001$). The moderating effect of depression was found as a significant factor. For participants with depression and agitation, a significant change in passive behavior was related to significant change in agitated behavior. Thus, by focusing treatment on passivity, both types of neuropsychiatric behaviors improved. The implications of thoroughly assessing not only a behavior problem such as agitation but also other neuropsychiatric symptoms that complicate the delivery of the intervention are discussed.

Article:

Approximately 5.2 million people in the United States have Alzheimer's disease or a related disorder (ADRD) (Alzheimer's Association, 2007). It is estimated that this number will grow to 7.7 million by the year 2030 and to 13.2 million by the year 2050 (Alzheimer's Association, 2007). The overall prevalence of ADRD doubles for every 5-year age group older than 65 (National Institute on Aging, 2010). It is well established that older adults with ADRD exhibit multiple behavioral and psychological symptoms such as agitation, passivity, and depression, which may decrease their levels of engagement in meaningful life experiences (Rabheru, 2004). Not only do these complex symptoms have an effect on engagement levels, they also increase patient and family distress and are difficult to manage across care settings (Harman et al., 2002; Janzing, Bouwens, Teunisse, Van't Hof, & Zitman, 1999).

Older adults with multiple problems benefit from interdisciplinary person-centered approaches (Zimmerman et al., 2005). In this type of model, health care professionals from different disciplines are often cross trained and work together to provide integrated treatment approaches. Experts believe when professionals from different disciplinary backgrounds work together to combine their specialized disciplinary knowledge, concepts, and assessment tools for problem solving and decision making, the resulting outcome is much greater than the sum of the parts of any one discipline (Bermejo et al., 2009). Although there is some evidence (Callahan, 2006; Unutzer et al., 2002) that effective interdisciplinary teams are able to incorporate their collective discipline knowledge to problem solve in complex situations and produce better outcomes for patients in primary care, few studies exist that capture this in long-term care settings. It is unclear what the relationship is in individuals with depression and dementia experiencing neuropsychiatric behaviors.

There is a dearth of research that examines the use of interdisciplinary intervention approaches to engage older adults with dementia, neuropsychiatric behaviors, and depression in meaningful experiences to change behavior. Thus, there appears to be a major gap in knowledge and coordination when it comes to nonpharmacological interventions for these common problems. The model proposed in this study considers

these behaviors as a “lack of engagement” in meaningful life experiences and suggests an interdisciplinary approach blending nursing and recreational therapy to help older adults with dementia and neuropsychiatric symptoms actively engage in meaningful activities again. Although individual factors such as depression may be associated with agitation in some patients with dementia, little research has examined the mediating and moderating effects that impact treatment approaches. The goal of this secondary analysis is to describe the relationship between treatment and passivity, treatment and agitation, and the impact of depression on overall outcomes.

LITERATURE REVIEW

Behaviors in Dementia

Although the majority of older adults with dementia live in the community, more than 16,000 nursing homes care for an estimated 1.5 million residents (Jones, Dwyer, Bercovitz, & Strahan, 2009), and it is estimated that approximately 70% of nursing home residents have ADRD. In terms of the epidemiology of neuropsychiatric symptoms, a 10-year, population-based longitudinal study found that 80% of the participants with Alzheimer’s disease (AD) had exhibited neuropsychiatric symptoms (Lyketsos et al., 2000). The most prevalent symptoms were apathy or passivity (36%), depression (32%), and agitation (30%) (Lyketsos et al., 2000). Another cross-sectional population-based study found that 95% of patients with ADRD had at least one neuropsychiatric symptom (Aarsland, Cummings, & Larsen, 2001). A more recent intervention study in five dementia care settings (N = 141) reported 58.9% of the participants had mixed behaviors (i.e., passivity part of the day followed by agitation), making tailoring and timing an important factor for delivery of interventions (Buettner & Fitzsimmons, 2006). In addition, a majority had either undiagnosed or untreated symptoms of depression (Buettner & Fitzsimmons, 2006).

Depression is one of the most frequent comorbid psychiatric disorders in ADRD, occurring in up to 77% of community-dwelling patients with dementia (Steinberg et al., 2008). For older adults with dementia, depression has been associated with increased mortality (Appleby, Roy, Valenti, & Lee, 2007) and decreased quality of life (Netuveli & Blane, 2008). For this cohort, depression adversely affects the ability to be independent in activities of daily living (Lam, Tam, Chiu, & Liu, 2007) and ultimately results in faster cognitive decline and earlier admission to a longterm care facility (Starkstein & Mizrahi, 2006). Depression in AD is markedly underdiagnosed, and most patients with depression are either not treated or on subclinical dosages of antidepressant medications (Greenberg, 2007). One study found that 42% of older adults with depression and dementia received no documented nonpharmacological treatments targeting their mood disorder (Kverno, Rabins, Blass, Hicks, & Black, 2008).

Older adults with dementia and depression have greater impairments in cognitive flexibility and divided attention (Nakaaki et al., 2007) than those without depression. Patients with ADRD, apathy, and depression have greater executive dysfunction than those with ADRD and either apathy or depression alone (Nakaaki et al., 2008). According to the Diagnostic and Statistical Manual of Mental Disorders, fourth edition, text revision (American Psychiatric Association, 2000), a primary symptom of depression may be loss of interest or pleasure in activities instead of depressed mood. However, in adults with dementia, loss of interest or pleasure in activities may reflect, or be exacerbated by, a loss of motivation as seen in apathy or passivity (Landes, Sperry, & Strauss, 2005).

Theories on Behavior

Researchers in the past have made significant efforts to explain the causes of neuropsychiatric symptoms in older adults with dementia. Cohen-Mansfield, Marx, and Werner (1992b) described the relationship of boredom and lack of activity in agitation, but they do not discuss passivity or depression. Hall and Buckwalter (1987) theorized that behaviors occur due to a progressively lowered stress

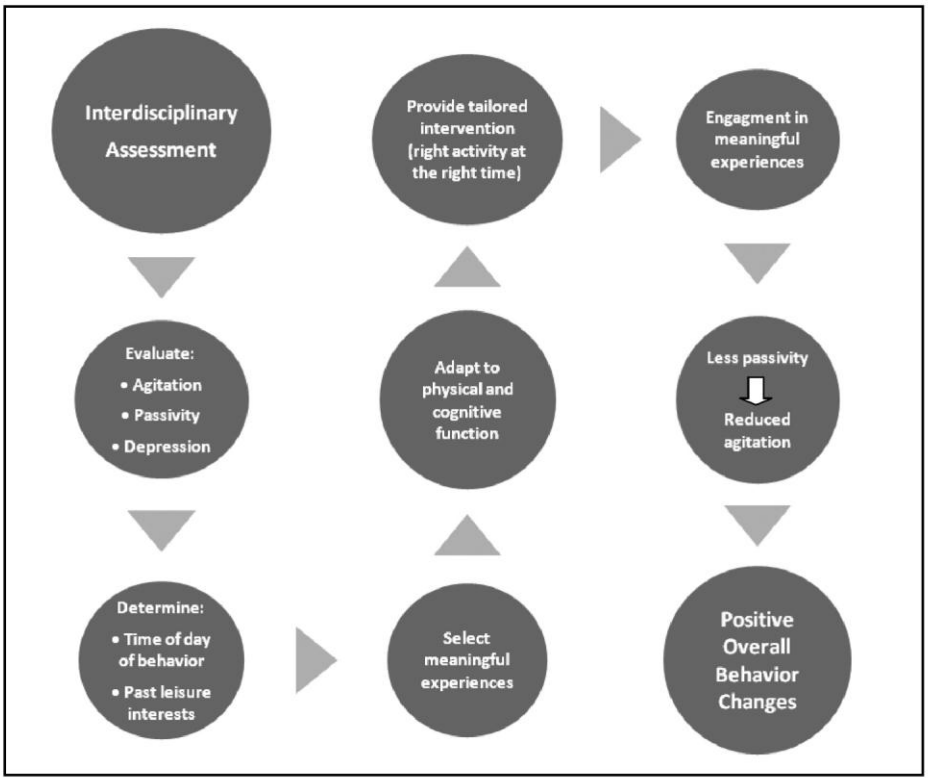

Figure 1. Interdisciplinary approach to tailored interventions.

threshold. In this progressively lowered stress threshold model, those with the most impairment appear to have the least ability to cope with both internal and external stressors in the environment; interventions in the model are derived that keep individuals with dementia below the threshold of critical stress. Another theoretical work, the Need-Driven Dementia-Compromised Behavior model, offers a view that behaviors are expressions of unmet needs (Algase et al., 1996; Kolanowski, 1999). Background and proximal factors are manipulated to meet needs and reduce behaviors. Neither of these models describes a lack of engagement in meaningful life experiences as a problem. Despite a clearer understanding of these stressors and unmet needs, treatment primarily remains the prescription of pharmacological agents (Sink, Holden, & Yaffe, 2005). Evidence-based reviews indicate pharmacological treatments have limited effectiveness for certain behaviors, such as wandering and vocalizing, and have serious side effects for older adults who are also treated with antidepressant agents (Sink et al., 2005; Stevens, 2008). None of these models focuses on engaging participants in meaningful experiences to relieve stress or meet needs for movement, stimulation, or connection with others. We believe engaging participants with dementia and a neuropsychiatric symptom in meaningful active experiences is crucial in treating these problems.

For our study, we placed interdisciplinary assessment and planning at the foundation of the treatment framework. To optimize engagement levels, an interdisciplinary assessment was completed by researchers from nursing and recreation therapy that included depression, agitation, passivity, past leisure interests, current functioning levels, and time of day needed for the intervention. The nonpharmacological intervention for behavior change was tailored with the goal of engaging participants in meaningful experiences. Adaptation of the activity was based on cognitive and physical abilities and is part of the tailored intervention approach. The treatment was timed to take place before agitation occurred, thus engaging older adults in a meaningful experience during passive periods. In this framework, engagement of individuals with dementia in meaningful tailored activities leads to a change in both passive and agitated behaviors (Figure 1).

Interdisciplinary Nonpharmacological Intervention Studies

A review of interdisciplinary intervention studies revealed that several approaches resulted in significant improvements in disturbing behaviors for individuals with dementia. Some treatment programs were tailored to

the facility's needs, and a few also included individually tailored treatment approaches. None of the studies examined the impact of depression on behavioral outcomes.

Rovner, Steele, Schmuely, and Folstein (1996) examined the effects of an activity therapy program on 81 nursing home residents. This treatment program included music, exercise, crafts, relaxation, and reminiscing and cognitive games. A significant decrease in both agitation and the use of medications was found in the treatment group at 6 months. The intervention reportedly reduced institutional barriers to participation in pleasant activities, increased residents' control over activity participation, increased overall engagement, and improved depressive symptoms. Despite low power, statistical and graphical comparisons suggested superiority of the intervention compared with treatment as usual.

Buettner and Ferrario (1998) used a structured recreational therapy-nursing intervention program in a 30-week randomized controlled trial of 60 residents in a new longterm care Alzheimer's unit. The treatment group (n = 30) participated in recreational therapy group sessions tailored to engage participants and integrated these therapeutic activities into the nursing schedule. The control group (n = 30) participated in nursing home activities and nursing care as usual. Evaluators, blinded to group assignment, completed baseline measures of agitation, cognitive function, depression, ambulation, strength, flexibility, and overall functioning. These same measures were repeated every 10 weeks. The treatment group exhibited significantly reduced levels of agitation throughout the 30-week study. Improvements in all variables occurred for the treatment group during the first 10 weeks of the program and leveled off at the 20-week measurement period. By engaging residents with agitation in therapeutic activities, depression was also lowered and function improved. In addition, the treatment group demonstrated a significant reduction in falls and the use of routine psychoactive medications.

In a study that used interdisciplinary staff and carefully designed activity areas with clusters of objects for socialization, researchers examined behavior change in 57 nursing home residents. Results showed that residents with moderate to severe impairments were more likely to use the activity areas and that visits to the activity areas were more likely to be resident initiated rather than staff initiated. However, the significance of this study was that when staff members took residents to the activity areas, the interaction time in the cluster was longer (Marcy-Edwards, Grant, & Slater, 2001). The authors concluded that by empowering staff to engage residents, the outcome was an enhanced positive experience for residents.

Sival, Vingerhoets, Haffmans, Jansen, and Ton Hazelhoff (1997) conducted a small study that included 3 individuals with severe dementia and behavior problems who had no response to neuroleptic medication. The participants were provided with diverse activities including group, musical, physical, and social activities. During baseline and follow up, the participants received traditional unit programming. The participants showed different responses, and the authors believed it was most likely related to the fact that past interests were not taken into account for intervention selection. The authors noted that nursing staff enthusiasm for the program was a promising result.

A 42-bed nursing home unit for individuals with dementia added a therapeutic program to improve quality of life by offering purposeful activities. This included cooking, arts and crafts, and horticultural programs. A music program was designed for the lowest functioning residents, and stations with various rummage items were set up. To reduce agitation at shift changes, the recreational therapy department held a snack program during this time. Nurturing doll therapy was introduced with stations for bathing and changing the dolls. The results of these changes led to a significant decrease in falls, an increase in nutritional status, and a reduction in agitation ("Nonpharmacologic Interventions," 2000). No measure of depression was reported in this creative program.

In a study of handmade recreational items called Simple Pleasures, various items were tested for safety, appeal, and ability to reduce disturbing behaviors on special care units. Specific physical activities such as the Simple Pleasures wandering cart, 2-foot × 2-foot wall hangings, table-ball, and tetherball were significantly ($p < 0.05$) helpful in alleviating restless behaviors (Buettner, 1999). The wandering cart allowed individuals who would

not stay seated at mealtimes to take finger foods from the cart as they wandered, and it also helped with agitated wandering into other residents' rooms or into the housekeeping areas. The wall hangings were helpful in ambulation and walking programs to encourage passive nursing home residents to reach and interact with the environment. Table-ball was most helpful with residents who were attempting to exit and was an active diversion for these residents. Tetherball was the most successful activity as it interested the highest number of residents (n = 47) for the longest amount of time (21 minutes) and was useful in reducing verbal and motor nonaggressive behaviors.

Wheelchair biking was used successfully in several research projects to reduce symptoms of depression, increase psychosocial opportunities with peers, and reduce passivity (Benson & Tatham, 2001; Buettner & Fitzsimmons, 2002; Fitzsimmons, 2001; Fitzsimmons & Buettner, 2001). This activity consistently brought depressed, inactive individuals to a new level of active engagement and significantly reduced symptoms of depression.

Shalek, Richeson, and Buettner (2004) studied the effects of a recreational therapy intervention—air mat therapy—on agitated wandering and agitated behaviors in older adults with dementia. Participants were evaluated using the Algase Wandering Scale and the Cohen-Mansfield Agitation Inventory in a pretest-posttest design. Twenty nursing home residents with dementia (Mini-Mental State Examination [MMSE] mean score = 4.9, mean participant age = 83.2) participated in a 2-week clinical trial of daily air mat therapy led by a certified therapeutic recreation specialist. The control condition was listening to music. Results of the Algase Wandering Scale indicated a significant decrease in two of the five subscales (spatial disorientation and eloping behavior) in the experimental group. In addition, a significant difference in the Cohen-Mansfield Agitation Inventory from pretest to posttest was noted for both the experimental and control groups.

In another study, at-home therapy for 30 individuals with dementia who did not attend day programs demonstrated significant decreases in agitation and depression after 2 weeks of tailored interdisciplinary interventions (Fitzsimmons & Buettner, 2002). In addition, participants displayed improved verbal and nonverbal communication skills, a reduction of agitation and anxiety was reported in all cases, and 93% reported an increase in active engagement in pleasant leisure activities.

A clinical trial of therapeutic cooking classes for participants with cognitive impairment residing in an assisted living setting found significant reductions in both agitation and passivity (Fitzsimmons & Buettner, 2003). Buettner and Fitzsimmons (2004) also found exercise to music had a significant impact on behaviors when offered in the morning compared with the afternoon, giving strength to the consideration of time of day for programming. This study discussed the importance of interdisciplinary scheduling to maximize therapeutic outcomes.

The simulated presence of others, in which videotapes of significant others are played for individuals who are distressed and lonely, has produced promising outcomes in reducing disturbing behaviors (Werner, Cohen-Mansfield, Fischer, & Segal, 2000). A videotape of a family member talking to the participant decreased verbally disruptive behavior by 46%.

Verbally disruptive behavior was reduced by 31% during music groups in a study by Cohen-Mansfield and Werner (1997). Outdoor walking programs and the use of outdoor wandering gardens also helped reduce boredom and restlessness, and helped accommodate individuals with agitated behaviors (Cohen-Mansfield & Werner, 1998).

In summary, all of the interdisciplinary intervention studies detailed in the literature review produced significant improvements in disturbing behaviors for individuals with dementia. Although several of these intervention studies examined depression as a variable, none considered the impact of depression on behavioral intervention outcomes.

PURPOSE

The model proposed in this study considers the problem of behaviors as a "lack of engagement" in meaningful life experiences as the core issue and suggests that an interdisciplinary approach blending nursing and recreational therapy may help older adults with dementia and neuropsychiatric symptoms actively engage in meaningful experiences again. Active engagement pulls participants out of a passive state, expending energy, providing pleasure and movement opportunities, and reducing other neuropsychiatric symptoms. Although individual factors such as depression may be associated with behaviors in older adults with dementia, little research has examined the mediating and moderating effects that impact interdisciplinary treatment approaches. Therefore, this study examined the mediating effects of passive behavior in interdisciplinary treatment of agitation and the impact of underlying depression on outcomes.

METHOD

Design

In this secondary analysis, we investigated the relationships between changes in passivity and changes in agitation as an outcome of this interdisciplinary treatment approach. In addition, we examined the moderating effect of depression on behavioral outcomes. The study used a crossover design with one intervention group and one delayed intervention control group. Following the collection of baseline assessment data on Days 1 to 5, participants were randomly assigned to one of the two groups. Six participants were involved at a time, with 3 participants in the treatment group and 3 participants in the delayed intervention control group. The treatment group received individually prescribed recreation therapy 5 days per week for 2 weeks. No treatment occurred on weekends. The delayed intervention control group received usual nursing home care and a 20- minute social visit from a research team member, followed by the individually prescribed therapeutic recreation program in a later round of the study. Thus, every participant in the study received the intervention and served as a wait list control.

During baseline data collection, participants were observed for activity levels and time of behaviors, and underwent assessment for recreational preferences, cognitive and physical ability, and depression. On the basis of these assessments, a tailored recreational therapy intervention was created for each individual. Data were collected using paper-and-pencil behavior scales completed by trained nurse reviewers blinded to group assignment 5 days prior to initiation of the treatment-control condition and again 3 days after the treatment-control condition ended. This process was repeated until 105 participants took part in the treatment group as statistically predetermined to achieve 0.80 power in the study.

To determine the category of behavior we would target (passivity, agitation, or both), passivity and agitation behaviors were monitored by observation throughout the day for 5 days. The behavior was coded for eight time periods in 2-hour blocks. The time periods evaluated started at 6 a.m. and ended at 10 p.m.. Recreational interests, functional abilities, depression symptoms, and current participation levels were also gathered to provide information for the prescription. To develop the prescribed recreational intervention, the research team, consisting of a recreational therapist (L.L.B.) and nurse practitioner (S.F.), designed an individualized plan for each participant based on the target behavior, time of day needed, past leisure interests, and current functional abilities. For example, a participant with severe verbal behaviors starting at 2:30 p.m., who enjoyed bowling in the past but was no longer able to stand or walk without assistance, was provided with a small group tabletop bowling session daily right after lunch. A sample of the prescription might read, "Adapted tabletop bowling daily for 30 minutes, 5 days per week for 2 weeks, to calm agitated verbal behaviors."

This project included 105 participants recruited from five different long-term care residences in the southeastern United States. Inclusion criteria for participants were 65 or older; diagnosis of dementia in the medical record; MMSE (Folstein, Folstein, & McHugh, 1975) score of 0 to 26, with the higher scores included to allow for the impact of higher education; written consent by legal guardian and assent by participant; stable on current medications for 2 months as determined by chart review; and identified by staff as having behaviors of either passivity or agitation.

Measures

Demographics. Demographic data collected included age, gender, type of dementia diagnosis, level of cognitive impairment, living arrangements, and length of time in current setting.

Agitation. The Cohen-Mansfield Agitation Inventory, a 29-item caregiver rating questionnaire for the assessment of agitation in older adults (Cohen-Mansfield, 1986), was used to assess participants at baseline and after 2 weeks of treatment. This tool includes descriptions of 29 agitated behaviors that are each rated on a 7-point scale of frequency. Interrater agreement rates ranged between 0.88 and 0.92 for this study.

Passivity. The Passivity in Dementia Scale (PDS) was used to measure passivity at baseline and after 2 weeks of treatment. In developing the parent instrument, Colling (2000) created a taxonomy that placed 58 behaviors in one of five categories: diminution of thinking, emotions, interactions with the environment, interactions with persons, and activity. The taxonomy was reviewed by a panel of six expert nurse raters. Following two rounds of reviews, the overall kappa was 0.69, indicating substantial agreement beyond chance. Colling (2000) obtained interrater reliabilities of 0.87 to 0.97 for the subscales in the parent PDS. The activity subscale form was derived from the parent PDS and was completed pre- and postintervention in this study.

Depression. The Geriatric Depression Scale (GDS) (Yesavage et al., 1982-1983) is a screening tool for identifying depressive symptoms in older adults. This tool is useful in clinical settings to facilitate assessment of depression in older adults, especially when baseline measurements are compared with subsequent scores. The 15-item GDS showed a significant agreement with the clinical diagnosis of depression (kappa = 0.74). A geriatric nurse practitioner assessed baseline depression for all participants using the 15-item version of the GDS.

Data Analysis

Demographics. The majority of participants were women (77.1%) and Caucasian (98.1%). Approximately two thirds (67.6%) of the participants did not receive antidepressant medications. Mean age was 86.3 (age range = 67 to 101). Approximately 63% of participants resided in nursing homes and 37% resided in assisted living centers. The average length of time participants had lived at the care facility was 25 months. On average, participants took six prescribed medications per day. Mean MMSE score was 8.36 (range = 0 to 26).

Baseline behaviors indicated 33.3% (n = 35) of the sample had passivity, 28.6% (n = 30) had agitation, and 38.1% (n = 40) had mixed behaviors. Mixed behaviors were defined as passivity and agitation occurring on the same day. Depression was coded as no depression for GDS scores ≥5 and as depressed for GDS scores %5 on the 15-item tool. Table 1 compares demographics for study participants with and without depressive symptoms.
Demographics

TABLE 1

Demographic Characteristics of the Sample

	Without Depressive Symptoms ($n = 64$)	With Depressive Symptoms ($n = 41$)	Total ($N = 105$)
Variable	***n*** **(%)**	***n*** **(%)**	***n*** **(%)**
Gender			
Women	45 (70.3)	36 (87.8)	81 (77.1)
Men	19 (29.7)	5 (12.2)	24 (22.9)
Race/ethnicity			
Caucasian	62 (96.9)	41 (100)	103 (98.1)
African American	1 (1.6)	0 (0)	1 (1)
Hispanic	1 (1.6)	0 (0)	1 (1)
Dementia type			
Unspecified	28 (43.8)	15 (36.6)	43 (40.9)
Alzheimer's	25 (39.1)	15 (36.6)	40 (38.1)
Mixed	5 (7.8)	5 (12.2)	10 (9.5)
Parkinson's	3 (4.7)	2 (4.9)	5 (4.8)
Vascular	3 (4.7)	4 (9.8)	7 (6.7)
Unit type			
Special care	24 (37.5)	20 (48.8)	44 (41.9)
Assisted living special care	23 (35.9)	6 (14.6)	29 (27.6)
Long-term care	10 (15.6)	12 (29.3)	22 (21)
Assisted living	7 (10.9)	3 (7.3)	10 (9.5)
Target behavior			
Agitation	20 (31.3)	10 (24.4)	30 (28.6)
Passivity	20 (31.3)	15 (36.6)	35 (33.3)
Mixed	24 (37.5)	16 (39)	40 (38.1)
	Mean (*SD*)	**Mean (*SD*)**	
Age in years	86.2 (7.3)	86.4 (6.4)	
MMSE score	8.3 (7.8)	8.5 (8.3)	
GDS score	3.6 (3.1)	4 (3.2)	
Length of time in facility in months	22.3 (15.1)	31.6* (26.5)	

Note. Percentages may not equal 100 due to rounding.
GDS = Geriatric Depression Scale; MMSE = Mini-Mental State Examination.
* $p \leq 0.01$.

were similar for participants with and without depression in all areas with the exception of length of time in the facility; a statistically significant difference was found ($p < 0.01$) in length of time at the facility and depression, with those living at the facility longer being significantly more depressed.

Mediation Modeling. Statistical mediation is a powerful methodological technique that has grown out of the work of Baron and Kenny (1986) and has been further extended in the work of MacKinnon (MacKinnon, 1994, 2008; MacKinnon & Dwyer, 1993). Mediation analysis allows the research to go beyond the testing of associations among variables as seen in multiple regression or bivariate correlations, to a level in which processes that may be leading to associations among variables can be tested.

Baron and Kenny (1986) defined a mediating variable as "a variable that accounts for the apparent relationship between two other variables" (p. 1175). Mediation analyses are often useful to examine the relationship among three or more variables such as passivity, agitation, and depression as a way to explain the nature of the relationship. For instance, in their work with cancer patients, Beck, Dudley, and Barsevick (2005) used mediation analysis to examine the complex relationship between pain, sleep, and fatigue. The classic mediation testing takes place in four stages, in which we first determine if a predictor (in our case, the treatment) is related to the outcome (change in agitation). This is referred to as path c. Second, we must determine that the predictor (treatment) is related to the mediator (change in passivity). Third, we must see that when both the predictor and mediator are in the model, the mediator is a significant predictor of the outcome. In addition (at least in the classical testing framework), we must see in this last model with both mediator and predictor that path c is significantly reduced in strength.

More recently, the field has used a path model for testing mediation as shown in Figure 2, in which we see a path model relating the predictor (interdisciplinary treatment), a mediator (change in passivity), and an outcome (change in agitation). Algebraically, the mediation pathway is simply the product a *b, in which a is the regression coefficient from the predictor to the mediator and b is the pathway from the mediator to the outcome. The test for the statistical significance of this pathway is known as the Sobel test, which is simply a t test (MacKinnon, 1994).

In these formulae, a and b refer to the unstandardized regression coefficients, and S_{eb} and Sea refer to the standard errors of these coefficients. Both coefficients a and b, and their standard errors (S_{eb} and S_{ea}) are readily avail able from standard multiple linear regression. In addition to the statistical test of the hypothesis that this pathway is not equal to zero, newer methods allow for computation of the amount of explained variance that is accounted for by the mediation (MacKinnon, 2008). This analysis can be

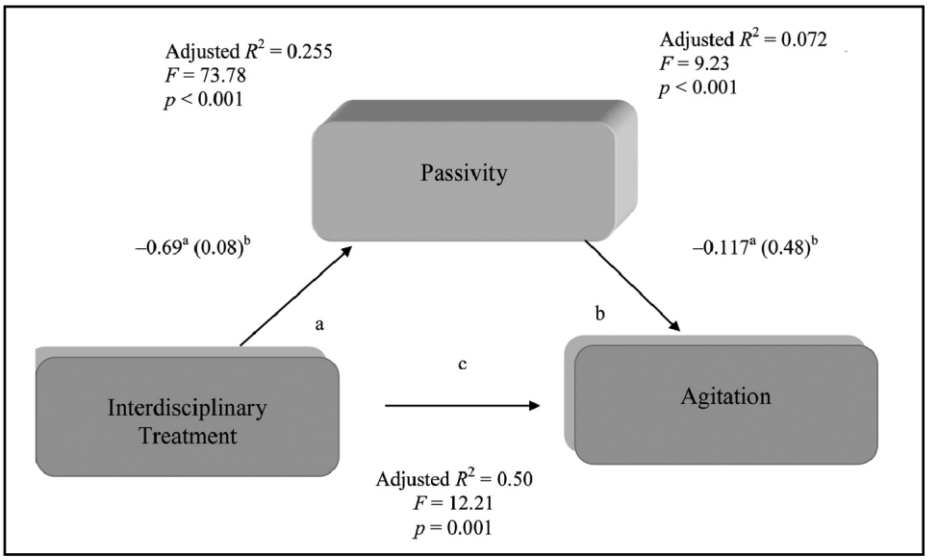

Figure 2. Overall mediation model: predictor (interdisciplinary treatment), mediator (change in passivity), and an outcome (change in agitation) path model.
[a] Raw coefficient (ß), [b] standard error of raw coefficient (ß), Sobel test $t(213) = 2.35, p < 0.01$.

conducted using straightforward linear regression models, and several freestanding programs are available for this including Preacher's interactive website (Preacher & Leonardelli, 2001) and the work by Dudley et al. (Dudley, Beck, & Barsevick, 2004; Jasti, Dudley, & Goldwater, 2008), which provide both SPSS and SAS programming to accomplish these analyses.

Moderation means that the effect of a variable on an outcome is altered (i.e., moderated) by another variable. Moderation is usually captured by an interaction of two initial variables. In mediation analysis, we may conceptualize a moderated mediation in which the mediation effect is found at one level of moderator but not at

other levels. The focus of this article is the moderating effect of depression on the mediation model shown in Figure 2. We posit that mediation may be seen in depressed participants but not in those participants who are not depressed. To demonstrate this, we have performed the analyses for the entire group and then separately for depressed and not depressed participants.

Preparation of Data

The data were collected in a totally within-subjects crossover design in which patients were randomly assigned to participate in the treatment condition or control condition. At the start and conclusion of both conditions, participants were assessed for agitation and passivity. Previous analyses indicated that this order effect was not significant, and thus we simplified the data structure to accommodate the mediation analyses as follows. First, we computed change scores for both passivity and agitation by subtracting the pretest scores from the posttest scores. Second, because the mediation modeling framework does not fit well within this repeated measures design, we used data from each participant twice (once from participants' treatment condition and once from their control condition). We recognize that by unlinking the participants, we ignored the potential correlations within participants, which should provide more statistical power because each individual acts as his or her own control. However, we believed it was necessary to sacrifice this strength of the original design to structure the data in a way that allowed us to examine the mediation effects in this secondary analysis.

RESULTS

Change in Passivity as a Mediator on Change in Agitation

The results indicate that in step 1, interdisciplinary tailored treatment was significantly associated with change in agitation (path c): $F = 12.21$, $p = 0.001$, in the overall sample (both depressed and nondepressed). Approximately 50% (adjusted R2 = 0.50) of the variation in agitation was associated with interdisciplinary treatment. In step 2, interdisciplinary tailored treatment was significantly associated with change in passivity (path a): $F = 73.78$, $p < 0.001$. Approximately 26% (adjusted $R^2 = 0.255$) of the variation in passivity was associated with interdisciplinary treatment. In step 3, change in passivity was significantly associated with change in agitation (path b): $F = 9.23$, $p < 0.001$ (Figure 2). In step 4, the Sobel test was significant: $t(213) = 2.35$, $p < 0.0$ 1, indicating that change in passivity partially mediated the relationship between treatment and change in agitation.

Therefore, interdisciplinary tailored treatments lead to a significant change in agitation; however, this change was mediated by the change in passivity. By engaging participants in meaningful experiences, they became significantly less passive and significantly less agitated.

TABLE 2

Mediation Model Total for Participants With and Without Depression

Model/Path	Coefficient (*SE*)	*p* Value	Sobel Test	Adjusted R^2
Model 1 (total)				
Path a	−0.690 (0.08)	<0.001		0.255
Path b	−0.117 (0.48)	<0.015		0.072
Path c	0.197 (0.056)	0.001	$t(213) = 2.35, p < 0.01$[a]	0.50
Model 2 (depressed)				
Path a	−0.735 (0.156)	<0.001		0.210
Path b	−0.171 (0.063)	<0.009		0.192
Path c	0.321 (0.091)	0.001	$t(77) = 2.34, p < 0.02$[a]	0.127
Model 3 (not depressed)				
Path a	−0.708 (0.095)	ns		0.317
Path b	−0.122 (0.096)	ns		0.644
Path c	0.036 (0.077)	ns	$t(115) = 0.46, p < 0.064$	0.064

Note. ns = not significant; SE = standard error.

[a] Depressed (model 2) indicates a significant change in agitation takes place when passivity is targeted.

Moderation effect of Depression

This process was repeated after sorting the participants by no depressive symptoms and depressive symptoms. Participants with depressive symptoms engaging in tailored therapeutic recreation had a significant change in both passivity and agitation. The Sobel test was significant, $t(77) = 2.34$, $p < 0.02$, for those with depressive symptoms (Table 2).

However, the change in passivity did not mediate change in agitation when the process was repeated for participants without depressive symptoms. The Sobel test, $t(115) = 0.46$, $p < 0.064$, indicated directing treatment toward passivity would be less effective for those without depressive symptoms. In summary, change in passivity significantly mediated treatment of agitation for participants with depression.

DISCUSSION

Results indicate that an interdisciplinary approach to assessment and treatment of agitation in dementia is mediated by change in passivity for those with depression. “One size fits all activities” is not the answer, and previous research shows residents with dementia receive few appropriate activities (Buettner & Fitzsimmons, 2003). Few complaints are heard about residents just sitting doing nothing. This study suggests that by engaging residents who have depressive symptoms during periods of passivity, agitation is significantly changed in a positive way.

This finding also suggests the importance of evaluating all neuropsychiatric symptoms in a holistic manner, rather than simply targeting agitation for an intervention. Frequently, medication is used to treat agitation without considering these other factors. Through an interdisciplinary assessment, the team might find that earlier in the same day, the same resident spent hours sitting immobile with nothing to do and without meaningful experiences to provide an exercise outlet, social connections, or pleasure (Buettner & Ferrario, 1998). This scenario has been confirmed in several prior studies that indicate being occupied in the same pursuit for longer than 1.5 hours leads to becoming bored or being socially isolated and is a cause of agitation and distress (Cohen-Mansfield, Marx, & Werner, 1992a; Cohen-Mansfield, Werner, & Marx, 1990; Kovach & Schlidt, 2001; Ragneskog, Gerdner, Josefsson, & Kihlgren, 1998). In a behavioral assessment process, the interdisciplinary team may also uncover previously undiagnosed symptoms of depression (Ischer, Schild, Strebel, Lang, & Gilgen, 2002). Use of psychoactive medication for agitation is common and in most cases sedates individuals with distress, whereas the interdisciplinary team approach that focuses on engaging

individuals earlier in the day provides an alternative that aligns with current nursing home survey standards (Buettner & Buckwalter, 2006).

Dwyer and Byrne (2000) found depressive symptoms were associated with disruptive vocalization in nursing home residents, one of the most problematic forms of agitation (Sloane, Davidson, Knight, Tangen, & Mitchell, 1999). In our study, we provided carefully planned recreation therapy during periods of passivity, with the goal of engaging residents in meaningful experiences. For those with depression, 2 weeks of daily interventions significantly changed passive and agitated behavior. This type of time- limited intervention may be vitally important on a unit where one individual disrupts the environment for all who live and work there. A majority of physicians agree that medications for depression are effective. However, studies indicate that one third of older adults are treatment- resistant and that response time to remission can start at 2 weeks but may take up to 12 weeks to occur (Alexopoulos, 2008; Whyte et al., 2004). Our mediation model suggests that tailored daily recreation therapy for 2 weeks changes behaviors in a much shorter time period. This dosing information is helpful to all practitioners and may serve as a stopgap until medications induce the desired change in depression.

Although this secondary analysis and numerous other studies indicate that nonpharmacological interventions are effective in reducing passivity and preventing or reducing disturbing behaviors for individuals with dementia, few interdisciplinary long-term care teams have infused this research into their practice. The future challenge lies in creating teams that will coordinate assessment and treatment approaches into an intervention strategy to help residents live more active and meaningful lives.

LIMITATIONS

We did not control for which nurse rater performed the assessments in these data; we might have obtained a more tightly evaluated dataset with assessor as a variable. Depression was not measured at all of the time points, limiting the temporal comparisons that could be made in this model. Because baseline GDS was used as the moderator, one must consider the 2-week period that elapsed from baseline to measurement of posttest behavior change; this alone might account for our findings. Although we were able to examine change in passivity and change in agitation, a posttest GDS score was not obtained.

RECOMMENDATIONS FOR FUTURE RESEARCH

This study was a small-scale project that led to the development of practice guidelines for recreational therapy and a specific interdisciplinary assessment and treatment method for the long-term care behavior team. Future studies on a larger and more diverse sample should take place since this was primarily a female and Caucasian sample.

Research in the future should include pre- and posttest measures of depression to determine whether this inter-disciplinary approach changes depressive symptoms as it changes behavioral symptoms. Examining change in depression as well as change in behavior may require a longer intervention period. A major barrier to implementation of this approach is education and training of long-term care staff to carefully assess for depression along with agitation and passivity. A large-scale evaluation of neuropsychiatric outcomes should be studied for staff receiving this training and residents receiving this treatment option by routine care providers.

CONCLUSION

Behavioral and psychological symptoms of dementia are widespread in long-term care residents. Both agitation and passivity commonly occur within the same resident in the same day. These behavioral symptoms are frequently associated with depression, which serves as a moderator when providing nonpharmacological interventions. For residents with both types of behaviors (i.e., passivity and agitation), interventions should be delivered during passive periods. The findings suggest the need for comprehensive assessment of both types of behaviors, along with evaluation of depression as interdisciplinary teams prepare intervention plans.

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