Published in final edited form as:

Psychol Aging. 2014 December ; 29(4): 776–786. doi:10.1037/a0037626.

Why Does Placement of Persons with Alzheimer's Disease into Long-term Care Improve Caregivers' Well-Being? Examination of Psychological Mediators

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Abstract

Caregiving for individuals with Alzheimer's Disease (AD) is associated with chronic stress and elevated symptoms of depression. Placement of the care receiver (CR) into a long-term care setting may be associated with improved caregiver well-being; however, the psychological mechanisms underlying this relationship are unclear. This study evaluated whether decreases in activity restriction and increases in personal mastery mediated placement-related reductions in caregiver depressive symptoms. In a five-year longitudinal study of 126 spousal AD caregivers, we used multilevel models to evaluate placement-related changes in depressive symptoms (CESD-10), activity restriction (Activity Restriction Scale), and personal mastery (Pearlin Mastery Scale) in 44 caregivers who placed their spouses into long-term care relative to caregivers who never placed their CRs. The Monte Carlo Method for Assessing Mediation (MCMAM) was used to evaluate the significance of the indirect effect of activity restriction and personal mastery on post-placement changes in depressive symptoms. Placement of the CR was associated with significant reductions in depressive symptoms and activity restriction, while also being associated with increased personal mastery. Lower activity restriction and higher personal mastery were associated with reduced depressive symptoms. Furthermore, both variables significantly mediated the effect of placement on depressive symptoms. Placement-related reductions in activity restriction and increases in personal mastery are important psychological factors that help explain post-placement reductions in depressive symptoms. The implications for clinical care provided to caregivers are discussed.

Keywords

stress; depression; activity restriction; personal mastery; Alzheimer's Disease

It has been well-documented that informal caregivers of persons with Alzheimer's Disease (AD) experience high stress, often resulting in elevated symptoms of depression and poorer overall well-being (Mausbach, Chattillion, Roepke, Patterson, & Grant, 2013; Pinquart & Sörensen, 2003a, 2003b). In their efforts to cope with these stresses, caregivers face the difficult decision of whether to continue caring for their loved-ones at home or to place them into a long-term care setting. Arrighi and colleagues (2010) report that 29% of persons with AD reside in long-term care by the time they are 74 years of age, and this ratio rises to 75% by 80 years of age. Several studies suggest that placement of the care receiver (CR) into long-term care has been associated with improved well-being on the part of the caregiver. For example, studies have shown significant reductions in caregiver depressive symptoms after placement of the CR (Gaugler, Mittelman, Hepburn, & Newcomer, 2010; Mausbach et al., 2007a). Others have reported that caregivers' psychological well-being is significantly improved following transition (Bond, Clark, & Davies, 2003). Grant and colleagues (2002) reported significant reductions in caregivers' depressive and serious medical symptoms following placement, and Mausbach et al. (2007a) reported significant long-term reduction of cardiovascular disease (CVD) risk in caregivers following placement.

Although long-term placement of persons with dementia may improve caregiver well-being, this effect is likely carried, at least in part, by a number of possible intervening variables (i.e., mediators). The Activity Restriction Model of Depressed Affect (Williamson & Shaffer, 2000) suggests that stress-related restriction of social and recreational activities causes depressed affect. That is, individuals under high stress restrict their engagement in enjoyable activities, which in turn increases their experience of depressive symptoms and negative affect. This model has been supported in studies of persons with chronic pain (Williamson & Schulz, 1995), persons with cancer and their caregivers (Williamson, 2000; Williamson, Shaffer, & Schulz, 1998), and caregivers of persons with dementia (Mausbach, Patterson, & Grant, 2008b; Mausbach et al., 2012). A recent meta-analysis found that activity restriction was highly correlated with depressive symptoms in persons with a variety of medical conditions, caregivers, and community-dwelling older adults (Mausbach et al., 2011). When considering the impact of the placement process on activity restriction, it is useful to refer to Pearlin and colleagues' (Pearlin, Lieberman, Menaghan, & Mullan, 1981; Pearlin, Mullan, Semple, & Skaff, 1990) Stress Process model of caregiver burden, which described four key areas that contribute to caregiver distress: background and context (e.g., socioeconomic status, other life events), primary stressors (e.g., problematic behaviors of the CR, level of help required by the CR), secondary role strains (e.g., conflict with family and social life), and secondary intra-psychic strains (e.g., diminished sense of control). Greater primary stressors can lead to increased secondary role strain. Placement of the CR into a long-term care facility would not only reduce caregivers' exposure to primary stressors such as CR aggression and nighttime wandering, but would also reduce the amount of time caregivers spend attempting to manage these behaviors. This would likely reduce the secondary role strain created when time and effort spent managing these stressors conflicts with caregivers' social, family, and leisure activities. More simply put, if caregivers spend less time managing the primary stressors of caregiving while the CR is in long-term care, caregivers should then have greater time for engaging in social and leisure activities and feel less restricted from doing so.

According to the Activity Restriction Model, this would in turn have a beneficial effect on caregiver well-being. To date, scientific application of the Activity Restriction model to caregiver transitions has been limited. Schulz and colleagues (2004) indicate that caregivers report significant increases in their engagement in and satisfaction with social activities following placement of their CRs. Bond et al. (2003) also found caregivers to engage in significantly greater levels of social activities following placement of their CRs. However, these studies did not report the relationship between change in activity restriction and change in well-being for caregivers following placement of their loved-ones.

The Stress Process model (Pearlin et al., 1981; Pearlin et al., 1990) is also applicable to the transition process with regard to the concept of personal mastery. The Stress Process model describes another consequence of ongoing caregiver stress as “intrapsychic” strains, which includes reduced feelings of mastery, and produces increased symptoms of depression. Greater levels of primary stressors (e.g., problematic CR behaviors, greater CR care needs) contribute to increased intrapsychic strain, including a decreased sense of control. A variety of studies have supported aspects of this model in caregivers. For example, Bookwala and Schulz (1998) found that greater CR behavioral and functional impairment was associated with reductions in their caregivers’ personal mastery. They further reported that lower personal mastery was associated with greater depressive symptoms in caregivers. In a sample of persons with malignant brain tumors, Sherwood et al. (2007) found that more CR problem behaviors were associated with reduced caregiver personal mastery. In turn, lower mastery was associated with greater depressive symptoms for the caregiver. This study also demonstrated that personal mastery partially mediated the relationship between CR problem behaviors and caregiver depressive symptoms. Mausbach et al. (2012) reported that personal mastery mediated the relations between both objective and subjective stressors and depressive symptoms. Again, consistent with Pearlin and colleagues’ model (Pearlin et al., 1981; Pearlin et al., 1990), as caregivers attempt to manage difficult behaviors such as aggression and nighttime wandering, often unsuccessfully, given the limited effectiveness of pharmacological treatments of neuropsychiatric symptoms in dementia (Sink, Holden, & Yaffe, 2005), their sense of control over their environment is reduced. Placing the CR into long-term care should not only reduce primary caregiving stressors as the amount of time spent providing direct care for the CR is decreased, but placement should also thus reduce the negative impact of these stressors on caregivers’ sense of control and personal mastery. Infurna and colleagues (2013) demonstrated significant increases in caregivers’ sense of personal mastery following placement of their loved-ones into long-term care. Given the strong links that personal mastery has with mood and psychological well-being (Halm & Bakas, 2007; Mausbach et al., 2006; Mausbach et al., 2012; Vahia et al., 2010), it is likely this increase in personal mastery would be associated with improvements in depressive symptoms.

In a test of the stress process and activity restriction models, the current study will determine the proposed mechanism that placement of a CR into a long-term care setting leads to reduced caregiver depressive symptoms through two mediating pathways: by increasing personal mastery and by reducing activity restriction. In testing this model, it is important to demonstrate that placement, activity restriction, and personal mastery are associated with depressive symptoms above and beyond the effects of other variables known to be related to

depressive symptoms in caregivers. As such, we selected a variety of covariates based on empirical evidence they may be related to depressive symptoms in this population. Specifically, a meta-analysis by Pinquart and Sörensen (2007) reported that older age was associated with fewer depressive symptoms in caregivers. Meta-analytic results also suggest that female caregivers express significantly more depressive symptoms than their male counterparts (Pinquart & Sörensen, 2006a), and that longer duration of care appears to be associated with greater report of depressive symptoms (Pinquart & Sörensen, 2003a). In a review of the caregiving literature, Schulz and colleagues (1995) reported that worse physical health and depressive symptoms were correlated, such that worse physical health was associated with greater report of depressive symptoms. In addition to its importance in Stress Process models (Pearlin et al., 1990), empirical evidence suggests that greater levels of social support are related to fewer depressive symptoms in caregivers (Haley, LaMonde, Han, Burton, & Schonwetter, 2003; Li, Seltzer, & Greenberg, 1997; Roth, Mittelman, Clay, Madan, & Haley, 2005). Among care recipient factors, greater degree of cognitive impairment and more problem behaviors are related to more depressive symptoms in caregivers (Pinquart & Sörensen, 2003a). In addition, use of professional and informal support services may reduce depressive symptoms in caregivers. Specifically, attendance of support groups (Chien et al., 2011), receiving psychosocial treatment(s) (Brodaty, Green, & Koschera, 2003; Pinquart & Sörensen, 2006b; Sörensen, Pinquart, & Duberstein, 2002), and use of antidepressants (Lavretsky, Siddarth, & Irwin, 2010) may all result in fewer depressive symptoms in caregivers. Given the potential impact of these variables we controlled for their effects in our analyses.

Method

Participants

The study involved 126 spousal caregivers of persons with dementia enrolled in the Alzheimer's Caregiver Study, a longitudinal study examining the effects of caregiving on overall health and well-being. Participants were recruited through referrals from the UCSD Alzheimer's Disease Research Center (ADRC), presentations at local support groups, and via community health fairs and events. All participants were required to be at least 55 years of age, residing with, and caring for a spouse at home with a confirmed physician diagnosis of Alzheimer's disease. Because a primary focus of the study was to determine the effects of caregiving on physiologic health markers, caregivers were excluded if they had a diagnosis of a physical condition that would alter biomarkers of primary interest to the study (e.g., cancer), had severe hypertension (i.e., 200/120 mmHg), or were taking medications that affected inflammation and hypercoagulability markers (i.e., oral anticoagulants, non-selective beta blockers, steroids). The study period was September 2007-August 2012, with recruitment occurring on a rolling basis between September 2007 and August, 2009. A total of 78 participants were enrolled in year 1 of the study, 44 in year 2, and the remaining 4 in year 3.

It was anticipated that during the course of the study some caregivers' spouses would die. As part of the study design, these caregivers would also receive post-deceased assessments to determine the impact of care receiver death on caregivers' health. However, because the

primary aim of this study was to determine the impact of placement, not bereavement, and because we and others have shown post-bereavement change in depressive symptoms is dependent on a multitude of factors (e.g., anticipatory grief, positive aspects of caregiving) (Boerner, Schulz, & Horowitz, 2004; Chan, Livingston, Jones, & Sampson, 2013; Mausbach et al., 2007a), post-deceased assessments were removed from all analyses.

Procedure

The study protocol was approved by the UCSD Institutional Review Board (IRB). After providing informed consent, caregivers meeting enrollment criteria were assessed in their homes. A trained research assistant interviewed participants by administering a series of questionnaires assessing psychosocial variables (e.g., activity restriction, personal mastery, depressive symptoms) and collecting demographic information. Assessments were scheduled to occur every 12 months for a period of up to 5 years. In addition to these standard assessments, caregivers were contacted every 3 months by research staff to obtain updates on their caregiving and health status. Caregivers were also encouraged to call research staff should there be any change to their health or caregiving status (e.g., they developed a serious medical condition or placed their spouse in a long-term care facility). If caregivers experienced a transition, staff documented this change and contacted the participant to set up a post-transition assessment to occur 3 months following the transition. By design, caregivers who placed their spouses, post-placement assessments occurred at 3, 15, and 27 months after the date of the transition, meaning that CGs who placed their spouses could have multiple post-placement assessments.

Measures

Depressive Symptoms—Caregiver depressive symptoms were assessed using the short form of the Center for Epidemiologic Studies Depression (CESD-10) scale (Andresen, Malmgren, Carter, & Patrick, 1994). The CESD-10 contains 10 items from the original 20-item scale (Radloff, 1977) and has been used in prior studies of both older adults and caregivers (Andresen et al., 1994). Caregivers reported the frequency with which they experienced each of the 10 symptoms over the past week. Response options ranged from 0 = “none of the time” to 3 = “most of the time.” An overall depressive symptoms score was calculated by summing the scores for the 10 items. Scores of 10 or higher are considered to represent clinically significant symptoms of depression (Andresen et al., 1994). For the present sample, alpha at the baseline assessment was acceptable ($\alpha = 0.77$). A systematic review demonstrated CESD scores to be related to a higher workload in caregivers as well as more behavioral disturbances in care recipients (Schoenmakers, Buntinx, & Delepeleire, 2010). Moreover, a meta-analysis demonstrating differences in psychological health between caregivers and non-caregivers showed large differences between caregivers and non-caregivers in depression, with 13 studies using the CES-D to measure depression (Pinquart & Sörensen, 2003b). O'Rourke (2004) found that abbreviated CESD scales, particularly those with 9 or fewer items, have significantly reduced reliability estimates relative to the full-length version. However, reliability of CESD scales with 10 or more items (such as used here) were not significantly different from the full-length version.

Activity Restriction—Caregivers’ perceived restriction of social and leisure activities was assessed using the Activity Restriction Scale (Williamson & Schulz, 1992). For this scale, caregivers rated the extent to which they felt restricted from engaging in 9 activities over the past month (e.g., “visiting friends”; “working on hobbies”). Response options range from 0 = “never or seldom did this” to 4 = “greatly restricted.” Items are summed to create an overall score, with higher scores indicating greater activity restriction. Alpha at the baseline assessment was 0.78, which is acceptable. A meta-analysis conducted by Mausbach and colleagues (2011) demonstrated that activity restriction had the highest correlation with depression scores in persons with medical conditions, followed by dementia caregivers, and the lowest correlation in community-dwelling adults. Of the studies included in this meta-analysis, the most commonly used measure of activity restriction was the Activity Restriction Scale.

Personal Mastery—Caregivers completed the 7-item mastery scale developed by Pearlin and Schooler (1978). This scale assesses the extent to which caregivers believed their life circumstances are under their control (e.g., “I have little control over the things that happen to me”; “I can do just about anything I really set my mind to do”). Responses ranged from ‘0’ = “strongly disagree” to ‘4’ = “strongly agree”. The total of the 7 items was used as a measure of overall mastery, with a higher score indicating a greater sense of mastery. Baseline alpha for the scale was acceptable ($\alpha = .75$). Among other studies of caregivers, Adams, Smyth, and McClendon (2005) reported Cronbach's alpha of .81, Mausbach and colleagues (2007c) reported alpha reliability of .77, and Skaff, Pearlin, and Mullan (1996) report an alpha of .75.

Self-rated health—Caregivers responded to a single-item of self-rated health asking, “In general, would you say your health is ____.” Responses options were ‘0’ = “Poor”, ‘1’ = “Fair”, ‘2’ = “Good”, ‘3’ = “Very good”, and ‘4’ = “Excellent”. Self-rated health has consistently been linked to psychiatric morbidity and related constructs in caregiving populations (Schulz et al., 1995).

Social Support—Each caregiver completed the Expressive Support scale developed by Pearlin and colleagues (1990). This scale consists of 8 items asking caregivers the extent to which they agree or disagree that caring, trustworthy, and uplifting others are available to them for support. Each of the 8 items is rated on a 5-point scale from ‘1’ = Strongly disagree to ‘5’ = Strongly agree. The 8 items are summed to create an overall social support scale. For the present sample, alpha at the baseline assessment was 0.72, which is acceptable. In accordance with caregivers’ reports of feeling unsupported by others in their responsibilities, Rose-Rego, Strauss, and Smyth (1998) observed that caregivers had lower expressive support than controls.

Use of Psychotherapy Services and Medications—Caregivers were asked two questions pertaining to their use of psychotherapy services. The first asked if they had attended a support group in the past month. The second question asked if they had seen a counselor/psychologist in the past month. Responses were coded 1 = yes and 0 = no. Caregivers were also asked to provide a list of all medications, either prescribed or over-the-

counter, they had taken in the past month. From this list, we created a variable indicating whether or not the caregiver had taken antidepressant medications (1 = yes, 0 = no).

Care Recipient Functioning—The Clinical Dementia Rating (CDR) scale (Morris, 1993) was used to assess the dementia severity of the CR. Level of functioning was reported by the caregivers in 6 behavioral and cognitive domains: memory, orientation, judgment and problem solving, community affairs, home and hobbies, and personal care. A total score was created based on scores from the 6 domains, with higher scores indicating more severe dementia.

Care Recipient Problem Behaviors—The Revised Memory and Behavior Problem Checklist was used to assess the number of behavioral problems exhibited by the care recipient (Teri et al., 1992). Caregivers indicated how often their care recipient displayed each of 24 behavior problems over the past week using a four-point scale from 0 (never) to 3 (daily or more often). Summing responses to the 24 items represents a total problem behavior score (range = 0–72). Prior research reports that individuals with dementia exhibit significantly more problem behaviors than older adults without dementia (Mausbach et al., 2013; Teri et al., 1992) and that the agitation and depression subscales on the RMBPC are significantly related to similar subscales on the Behavioral Pathology in Alzheimer's Disease (BEHAVE-AD) rating scale (Reisberg, Auer, & Monteiro, 1996) ($r = .61$ and $.64$, respectively). Teri and colleagues (1992) report an alpha reliability coefficient of $.84$ for the CR problem behaviors scale, and Cronbach's alpha for the present study at baseline was good ($\alpha = .81$).

Data Analysis

A depiction of the model tested is shown in Figure 1. In the current study, multilevel (mixed) models were used to estimate the 'a' and 'b' paths. First, we estimated paths 'a1' (effect of placement on activity restriction) and 'a2' (effect of placement on personal mastery). In these models, placement was time-varying, such that for assessments where the CR was living at home, the value was '0', and assessments where the CR was placed, the value was '1'. Covariates in these models included age, sex, years caregiving at baseline, social support, self-rated health, use of antidepressant medications, attendance of a support group, visit to a counselor/psychologist, CDR score, and CR problem behaviors. Of these, age, social support, self-rated health, use of antidepressants, support group attendance, and visit to a counselor/psychologist were time-varying predictors. Because CDR scores and CR problem behaviors were only assessed prior to CR placement, both variables were entered as each participant's pre-placement mean score. In addition to a main effect of CR problem behaviors, we included a problem behaviors by placement interaction to determine if placement was more strongly associated with changes in our outcomes for CGs who were more stressed. Initially, random intercepts were modeled with all predictors entered as fixed effects. We then tested additional models that included random effects for age and placement and compared these to our random intercepts model using Akaike's Information Criteria (AIC). If these random effects did not improve overall model fit, they were removed as random effects.

In our second model ('b' paths), score on the CESD was our DV, and our two mediators (i.e., activity restriction and personal mastery) were simultaneously added as predictors in our model. As with our original analyses, covariates included placement, age, sex, years caregiving at baseline, social support, self-rated health, attendance of a support group in the past month (yes vs. no), visit to a counselor/psychologist in the past month (yes vs. no), and use of antidepressant medications in the past 30 days (yes. vs. no). In this model, activity restriction, personal mastery, placement, age, social support, self-rated health, use of antidepressant medications, attendance of a support group, and visit to a counselor/psychologist were time-varying predictors. As before, we first tested a random intercepts model and subsequently examined models in which age, placement, activity restriction, and personal mastery were included individually as random effects. In cases where these random effects did not improve overall model fit, they were removed as random effects and entered simply as fixed effects. Once all 'a' and 'b' parameter estimates were determined, the Monte Carlo Method for Assessing Mediation (MCMAM) (Preacher & Selig, 2012) was performed using Selig and Preacher's (2013) online calculator. For our simulation, 20,000 repetitions were requested for constructing the 95% confidence interval.

As described above, our theoretical model postulated that activity restriction and personal mastery mediate the effect of placement on depressive symptoms. We also tested the reverse models, in which placement-related change in depressive symptoms mediated change in activity restriction and mastery. The models were run separately with activity restriction and mastery as dependent variables using the Monte Carlo method (Preacher & Selig, 2012).

Results

Participant Flow

Participant characteristics across the 5-year study are presented in Table 1. Of the 126 enrolled participants, 44 (34.9%) placed their loved ones into long-term care during the study, with an average time between enrollment and placement of 16.1 months (SD = 11.1 months). An analysis comparing caregivers who placed their loved-ones to those who did not indicated no significant differences in demographic (e.g., age, sex, years of education) or other study variables (e.g., personal mastery, activity restriction, depressive symptoms). Also, a total of 46 CRs died during the study. These cases were removed from the present analysis. Overall, the mean number of assessments per all participants in the study was 3.25 (SD = 1.28). Among the 44 participants who placed their spouses, the mean number of assessments was 3.91 (SD = 0.97), with a minimum of 2 assessments and a maximum of 5 assessments in this sub-sample. In addition, 15 CGs had their first post-placement follow-up at their second assessment, 15 at their third annual assessment, 11 at their fourth assessment, and the remaining 3 at the fifth assessment. Follow-up rates of the present study are similar to previous longitudinal dementia caregiver studies (Gaugler, Kane, Kane, & Newcomer, 2005; Mausbach et al., 2007d).

Effect of Placement on Outcomes

An initial analysis examined the raw (unadjusted) CES-D scores for caregivers at the assessment prior to, and immediately after CR placement. Among the 44 caregivers who

placed their loved-ones, the mean CES-D score at the assessment immediately prior to placement was 9.39 (SD = 5.82). The mean CES-D score at the assessment immediately after placement was 7.30 (SD = 6.06).

In multivariate analyses, our first model tested the direct effect of placement on total CESD scores (path c). Results indicated that after placement depressive symptoms decreased significantly ($B = -1.19$; $t = -2.27$, $df = 341.07$, $p = .024$). Overall, this model accounted for 30.5% of the variance in depressive symptoms. Our next two models examined the 'a' paths, which evaluated the effect of placement on our two mediator variables (i.e., activity restriction and personal mastery). Coefficients for each variable in the model, and their 95% confidence intervals, are presented in Table 2. Results of the first model (path a1), indicate that placement was associated with a significant reduction in activity restriction ($B = -3.92$; $t = -6.88$, $df = 367.02$, $p < .001$). This model accounted for 36.7% of the overall variance in activity restriction. Results also indicated that placement resulted in a significant increase in personal mastery (path a2; $B = 0.79$, $t = 2.45$, $df = 363.17$, $p = .015$), with the overall model accounting for 32.4% of the variance in mastery.

Our final model predicted depressive symptoms using placement and our two mediators. Results indicated that both activity restriction ($B = 0.12$, $t = 2.67$, $df = 382.99$, $p = .008$) and personal mastery ($B = -0.42$, $t = -5.12$, $df = 385.71$, $p < .001$) were significantly associated with depressive symptoms. The effect of placement was no longer significant ($B = -0.35$, $t = -0.64$, $df = 358.35$, $p = .525$), with the coefficient being reduced by 70.6% ($c - c'$) from the original model that did not include our mediators. Overall, this model accounted for 43.3% of the variance in depressive symptoms. Results of the Monte Carlo simulation are presented in Figures 2 and 3. As seen, the confidence intervals for the indirect effects of activity restriction (95% CI = -0.895 , -0.122) and personal mastery (95% CI = -0.654 , -0.061) did not cross '0', indicating both variables significantly and independently from each other mediated the effect of placement on depressive symptoms.

Results of our alternate models, in which placement-related change in depressive symptoms mediated change in activity restriction and personal mastery, were also significant. Specifically, change in depression significantly mediated change in activity restriction (95% CI = -0.467 , -0.027). Also, change in depression significantly mediated change in personal mastery (95% CI = 0.027 , 0.3956).

Discussion

For many AD caregivers, in-home caregiving is a chronically stressful experience, often resulting in elevated symptoms of depression. Although a great deal of effort has gone toward examining the efficacy of treatments to reduce caregiver distress (Gallagher-Thompson & Coon, 2007; Pinquart & Sörensen, 2006b), it remains that some caregivers opt to place their loved-ones into long-term care. Similar to prior reports, we found that CR placement was associated with improved well-being in caregivers (Bond et al., 2003; Grant et al., 2002; Mausbach et al., 2007a). However, the current study adds to the literature via demonstration that placement-related a) reductions in activity restriction and b) increases in personal mastery significantly accounted for a large proportion of post-placement reductions

in depressive symptoms. Additionally, through the use of a longitudinal design examining placement-related changes in psychological factors, these findings also provide evidence for potential mechanisms (i.e., activity restriction and personal mastery) by which caregiving may translate to reduced well-being (i.e., depressive symptoms). The findings of the present study are consistent with existing theoretical models of caregiver symptoms of depression, namely the Activity Restriction Model of Depressed Affect (Williamson & Shaffer, 2000) and the Stress Process model (Pearlin et al., 1981; 1990), as well as prior research demonstrating associations between caregiver depressive symptoms and activity restriction (Mausbach et al., 2008b; Mausbach et al., 2012) and low personal mastery (Bookwala & Schulz, 1998; Mausbach et al., 2008b; Mausbach et al., 2012). However, this study is the first to demonstrate the post-placement reductions in activity restriction and increases in personal mastery mediate improvement in depressive symptoms. Importantly, our additional analyses found that improvements in depression post placement also mediated decreases in activity restriction and increases in personal mastery, suggesting that the relationships among these constructs may be bidirectional.

In addition to supporting theoretical models explaining depressive symptoms in caregivers, the findings of the present study have implications for clinical care provided to caregivers and may lay the groundwork for designing new caregiver interventions. The present study found that caregivers' well being improved with increased personal mastery and decreased activity restriction, suggesting that these two psychosocial factors may be important treatment targets in the midst of ongoing caregiving. Specifically, interventions targeting activity restriction and personal mastery may be effective at treating or even preventing depressive symptoms in caregivers. For caregivers whose depressive symptoms do not improve post-placement, interventions aimed at increasing personal mastery and reducing activity restriction may be an effective tool for improving caregiver well-being, based on the longitudinal analyses of the present study.

Although the results of this investigation examined activity restriction and personal mastery after placement of the spouse with AD into long-term care, interventions targeting activity restriction and personal mastery could be implemented with dementia caregivers before spouse placement in an effort to improve well-being. Some preliminary evidence has demonstrated the efficacy of interventions targeting in-home caregivers' level of mastery or perceived sense of control. For example, Coon and colleagues (Coon, Thompson, Steffen, Sorocco, & Gallagher-Thompson, 2003) found that female dementia caregivers participating in either an anger management or depression management class demonstrated a significant improvement in perceived caregiving self-efficacy compared with caregivers in a wait list control group. Both the anger and depression management interventions were cognitive-behavioral in nature, with the anger management class focusing on relaxation exercises, cognitive restructuring of dysfunctional thoughts, and assertiveness skills, and the depression management class focusing on increasing caregivers' engagement in pleasant events and problem-solving to overcome obstacles to behavioral activation. Judge and colleagues (2013) tested an intervention for dementia caregiver-patient dyads consisting of six 90-minute sessions focused on developing skills for managing and coping with dementia symptoms. Caregivers in the intervention group had significantly higher caregiving mastery and lower emotional health strain compared with caregivers in the education control group.

In a randomized controlled trial with informal non-dementia caregivers (caring for persons with high-grade glioma brain tumors) a six-session cognitive-behavioral intervention increased caregivers' feelings of mastery over an eight-month period compared with a usual care control group (Boele et al., 2013). Another study found that older adults who participated in a 10-week intervention to enhance perceived control demonstrated increased personal mastery and reduced psychological distress compared with control participants (Reich & Zautra, 1989). Caregiver interventions specifically targeting activity restriction have been rare, although Moore et al. (2013) found that a brief intervention (four in-home and two phone sessions) aimed at increasing dementia caregivers' engagement in pleasant activities resulted in decreased depressive symptoms compared with an information and support control condition. The results of the present study indicate that increased personal mastery and decreased activity restriction mediate post-placement improvements in caregiver depressive symptoms over time. These findings, coupled with prior research suggesting that interventions can be designed to effectively increase personal mastery and/or decrease activity restriction in in-home caregivers, suggest that personal mastery and activity restriction may be appropriate targets for future interventions to promote caregiver well-being.

The longitudinal design of the present study is an important strength in demonstrating a mediating role of activity restriction and personal mastery in caregivers' improved depression after placement of the spouse into long-term care. Yet, our study is not without limitations. First, to strengthen the evidence of these effects, replication will be necessary. Our sample was relatively small and power may not have been optimal. Therefore, future studies may wish to enroll larger samples (e.g., >200 subjects) to optimize power to detect similar indirect effects (Mackinnon, Lockwood, & Williams, 2004) as well as improve generalizability of our findings. Second, our study did not answer important questions regarding the timing of placement effects. Specifically, it is still unclear if caregivers experience improvements in depressive symptoms immediately (i.e., within days or a few weeks) following placement, or if reductions in depressive symptoms take longer (i.e., months after placement). In the future, researchers may wish to assess post-placement depressive symptoms at timepoints closer to the actual placement of the care recipient. Third, the Personal Mastery Scale (Pearlin & Schooler, 1978), although widely used in caregiving and noncaregiving populations, was not developed in accordance with rigorous standards for proper test construction (Golden, Sawicki, & Franzen, 1990), and construct and content validity have not been strongly established for the scale. Another limitation is that data on marital quality were not collected, and the quality of the relationship may impact the effect of placement on caregivers' psychological well-being (Carr et al., 2000). Other limitations include the fact that we did not explore time-specific indirect effects as outlined by Selig and Preacher (2009), such as whether placement at assessment time 1 impacts activity restriction at assessment time 2, which then leads to decreased depression at assessment time 3. Exploring time-specific mediation for both mastery and activity restriction may lend more precision to the prediction of depression outcomes in caregivers post-placement and allow the exploration of questions such as 1) How long do the benefits of placement on depression last in caregivers? 2) Assuming a caregiver has just placed a CR, what are potential immediate and prolonged mediators of reduced depression? Because these

analyses can be complex, future studies should incorporate time-specific indirect effects into the design of the study itself.

With regards to the external validity of the current results, the sample in the present study is predominantly Caucasian and female; therefore, additional research is needed to determine whether these results are generalizable across ethnicity and sex. Additionally, the sample size of caregivers who placed a spouse into long-term care was relatively small; thus, these results warrant replication in future studies. The present study examined depressive symptoms using the 10-item short form of the CES-D scale, and there has been some concern on the use of abbreviated depression measures (O'Rourke, 2004). Thus, future studies should strongly consider including the full-length CESD to measure depressive symptoms.

In the current sample, approximately 40% of caregivers reported clinically significant symptoms of depression at baseline. Future research should investigate the mediating role of activity restriction and personal mastery on post-placement depression in samples of caregivers with higher baseline levels of depression to determine whether these relationships hold in a sample of caregivers with more severe depressive symptoms. Additionally, measurement of depressive symptoms with a diagnostic clinical interview may yield different results compared with a short symptom measure.

Although we found that caregivers experienced improved well-being following placement of their care recipients, others have not found such effects. For example, some family members experience notable guilt and grief following placement, and interventions have been developed specifically addressing post-placement symptoms of guilt among caregivers (Paun et al., 2014). Others report that caregiver immune function remains negatively depressed long after placement (Kiecolt-Glaser, Dura, Speicher, Trask, & Glaser, 1991). Therefore, future research is warranted that examines moderators of placement-related effects on well-being.

The results of this study lend preliminary support to the idea that post-placement reductions in depressive symptoms are mediated by increases in personal mastery and decreases in activity restriction. Existing evidence suggests that increased personal mastery and decreased activity restriction are associated with improved physiologic outcomes in caregivers as well, such as reduced sympathetic activation and reactivity (Ho et al., 2013; Roepke et al., 2008), better immune functioning (i.e., increased beta-2 adrenergic receptor sensitivity) (Mausbach et al., 2008a; Mausbach et al., 2007b), and lower blood pressure (Chattillion et al., 2012). Preliminary evidence indicates that caregivers may demonstrate changes in physiologic outcomes after placement of their spouse into long-term care (Mausbach et al., 2007a; von Känel et al., 2011; von Kanel et al., 2012). It is therefore possible that improvements in personal mastery and activity restriction post-placement may also mediate changes in physiologic outcomes in caregivers in addition to mediating improvements in psychological well-being. This topic warrants further investigation, as such findings could lend additional support for the development of interventions targeting personal mastery or activity restriction in dementia caregivers with the ultimate goal to also improve physical health in caregivers.

In summary, the present study examined a sample of dementia caregivers over a period of five years and found that caregivers' depressive symptoms improved after placement of their spouse with AD into long-term care. Improvements in depressive symptoms post placement were mediated by both decreased activity restriction and increased personal mastery. Although these results require replication, identifying the psychological mediators of the relationship between care recipient placement and improved caregiver well-being can help identify targets for intervention in caregivers that may help treat or even prevent the adverse consequences of dementia caregiving.

Acknowledgements

Primary funding was provided by the National Institute on Aging (NIA) via grant R01 AG015301. Additional funding was provided by the NIA via grant R01 AG031090.

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Figure 1.
Coefficients and standard errors for the indirect effects of Activity Restriction and Personal Mastery.

Figure 2.
Monte Carlo distribution and 95% CI estimates of the indirect effect of Activity Restriction.

Figure 3.
Monte Carlo distribution and 95% CI estimates of the indirect effect of Personal Mastery.

Table 1

Participant characteristics over the 5-year study period.

	Baseline (n = 126)	Year 1 (n = 108)	Year 2 (n = 89)	Year 3 (n = 67)	Year 4 (n = 19)
Age, M (SD)	74.15 (7.94)	75.59 (7.77)	76.71 (7.79)	77.83 (7.57)	78.28 (7.34)
Female, n (%)	89 (70.6)	74 (68.5)	62 (69.7)	43 (64.2)	13 (68.4)
Taking antidepressant(s), n (%)	33 (26.2)	30 (27.8)	25 (28.1)	17 (25.4)	6 (30.0)
Attended support group, n (%)	66 (52.4)	49 (45.4)	42 (47.2)	29 (43.3)	10 (52.6)
Visited a counselor/psychologist, n (%)	25 (19.8)	23 (21.3)	17 (19.1)	8 (11.9)	0 (0.0)
Social Support, M (SD)	25.85 (3.85)	26.18 (3.86)	26.73 (4.50)	26.85 (4.15)	26.00 (3.43)
Self-Rated Health, M (SD)	2.44 (0.95)	2.31 (0.91)	2.34 (0.90)	2.30 (0.98)	2.53 (0.84)
Personal Mastery, M (SD)	11.48 (3.29)	11.67 (3.45)	11.98 (3.30)	12.43 (3.50)	11.79 (3.41)
CR Problem Behaviors, M (SD)	23.65 (9.46)	23.31 (8.95)	20.27 (8.12)	19.19 (13.12)	21.00 (8.10)
Activity Restriction, M (SD)	16.01 (5.71)	15.91 (6.23)	15.46 (6.18)	15.18 (6.25)	14.95 (6.65)
CESD-10, M (SD)	8.78 (5.81)	8.26 (5.90)	7.97 (6.01)	7.97 (5.53)	8.47 (5.83)
CESD 10, n (%)	50 (39.7)	40 (37.0)	29 (32.6)	22 (32.8)	8 (42.1)

Note. Cell values are not cumulative, but represent the number of participants

Table 2

Parameter estimates and 95% confidence intervals for mediation paths

	Activity Restriction (Path a1)	Personal Mastery (Path a2)	Depressive Symptoms (Paths b1 and b2)
Age	-.11* (-0.20, -0.02)	0.00 (-0.05, 0.06)	0.00 (-0.09, 0.09)
Female	1.34 (-0.26, 2.95)	-.144* (-2.38, -0.50)	1.09 (-0.48, 2.66)
Self-rated health	-.143* (-2.02, -0.84)	.76* (0.43, 1.10)	-.65* (-1.21, -0.09)
Years Caregiving	-.04 (-0.25, 0.18)	.05 (-0.08, 0.18)	.04 (-0.17, 0.26)
Social Support	.00 (-0.13, 0.13)	.18* (0.10, 0.25)	-.12 (-0.24, 0.00)
Taking antidepressant(s)	-.132* (-2.62, -0.02)	-.26 (-1.00, 0.48)	-.03 (-1.23, 1.18)
Attended support group	.68 (-0.44, 1.80)	-.52 (-1.16, 0.11)	.89 (-0.14, 1.92)
Visited counselor/psychologist	.24 (-0.97, 1.45)	-.63 (-1.31, 0.06)	1.40* (0.30, 2.50)
CR CDR Score	3.07* (1.75, 4.39)	-.120* (-1.97, -0.43)	.61 (-0.70, 1.92)
CR Problem Behaviors	.19* (0.10, 0.28)	-.07* (-0.12, -0.01)	.11* (0.02, 0.20)
Placed	-.392* (-5.04, -2.80)	.79* (0.16, 1.42)	-.35 (-1.42, 0.73)
Problem Behaviors x Placed	.10 (-0.03, 0.23)	.02 (-0.05, 0.10)	.04 (-0.08, 0.15)
Activity Restriction	--	--	.12* (0.03, 0.21)
Personal Mastery	--	--	-.42* (-0.58, -0.26)
R ²	0.367	0.324	0.433

* p < .05. CDR = Clinical Dementia Rating.