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Tittle: Longitudinal Correlates of Depressive Symptoms and Positive and Negative Affects in Family Caregivers of People with Dementia

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The data for this manuscript have not been previously presented orally or by poster at scientific meetings.

Highlights

• What is the primary question addressed by this study?

How do cognitive and behavioral coping strategies among dementia family caregivers relate with depressive symptoms, positive affect, and negative affect over time?

• What is the main finding of this study?

The results showed that different coping strategies (i.e., cognitive vs behavioral) were associated with different components of depressive symptomatology.

• What is the meaning of the finding?

Findings support the concept of depressive mood as a complex construct and highlights the importance of analyzing different coping strategies when trying to comprehend the caregiving stress process.

Abstract

Objective: Caring for a relative with dementia is considered a chronically stressful role associated with negative consequences for psychological health such as higher levels of depression. However, the subjective experience of depressive symptomatology is complex as it relates to two unique domains: positive affect (PA) and negative affect (NA). The objective of this study was to analyze, through a longitudinal design, the associations of caregivers' cognitive (avoidance coping, personal mastery, and coping self-efficacy) and behavioral (frequency of pleasant events) coping strategies with depressive symptoms, PA, and NA.

Method: 111 caregivers of a spouse with dementia participated in this study. They were assessed yearly across 5 years. Mixed model regression analyses were conducted separately for depressive symptoms, PA, and NA, analyzing within and between-person associations of caregivers' age, gender, role overload, sleep quality and coping variables previously mentioned.

Results: The results showed that different coping strategies were associated with different components of depressive symptomatology. While avoidant coping was associated with NA and depressive symptoms but not PA at both within- and between-person levels, frequency of pleasant events was associated only with NA and depressive symptoms at the within-person level, showing no effect at the between-person level. Personal mastery and coping self-efficacy were found to be more transversal variables, being associated with most of the mood outcomes in both within and between-person effects.

Conclusions: Findings support the concept of depressive mood as a complex construct and highlights the importance of analyzing different coping strategies when trying to comprehend the caregiving stress process.

Objective

Caring for a relative with dementia is commonly described as a chronically stressful situation with negative consequences for caregivers' mental health. One of the most studied consequences of caregiving is depression, with caregivers often experiencing significantly more clinical symptoms than their non-caregiver peers (1-3). Research shows, however, that depression is a complex problem, composed by several dimensions. The tripartite model (4) suggests that two independent components underlie the unique experience of depressive symptoms: positive affect (PA) and negative affect (NA). PA represents a range of positive mood states, including joy, energy, enthusiasm, interest, alertness or self-confidence (4). NA is characterized by a person's feelings of upset or unpleasantness, and is commonly considered as general factor of subjective distress encompassing a broad range of negative mood states such as worry, fear, sadness, anger, guilt, scorn and disgust (4). In their seminal study on the tripartite model, Clark and Watson describe how individuals with anxiety and depression share an underlying non-specific affective state known as NA, but depression appeared uniquely characterized by a diminished experience of PA combined with increased NA. PA and NA are conceptualized as independent, modestly correlated constructs, rather than reciprocal in nature, and this has been confirmed in several studies (5-8).

A significant array of factors contributing to caregiver depression has been reported in the literature. For example, certain health variables, like sleep disturbance, has been found to show a significant influence on depressive symptoms (9, 10), PA (11) and physical health (10, 12) in caregivers. In addition, theoretical psychosocial models based on the stress and coping model (13) have received strong empirical support. These models (14, 15) highlight that caregivers' daily stressors (e.g., behavioral problems of the person with dementia) may produce a subjective feeling of burden or overload for the caregiver that, depending on other psychosocial factors could culminate in poor mental health outcomes in caregivers. Among

these factors, Mausbach and colleagues ((7) suggested, through a cross-sectional design, that negative cognitive appraisals were uniquely associated with higher levels of NA, while behavioral strategies like engaging in a higher number of pleasant events were associated with higher levels of PA only. These authors suggested then that PA and NA could be associated with different coping strategies in dementia caregivers.

One of the most commonly studied coping styles in the caregiving literature is avoidant coping, which includes cognitive strategies such as distracting from or denying stressors with the intention of mitigating their impact on caregivers' emotions (13). However, because this coping style leaves the stressors or problems unresolved, it is considered maladaptive and has been linked to negative long-term consequences for caregivers' health, including depression (16).

Other potential intervening cognitive variables in the stress and coping models that have also been studied in the caregivers' stress process are personal mastery and self-efficacy. Personal mastery is defined as the person's subjective perception of being in control over his/her life and circumstances (17). A longitudinal study (18) suggested that increased caregiver stress was associated with greater depressive symptoms only in the context of low personal mastery. Self-efficacy can be understood as the self-perception of one's ability to complete a specific task successfully (19). A greater sense of self-efficacy has been linked, through cross-sectional designs, with lower levels of depression in dementia caregivers (20, 21). In addition, caregivers with a greater self-efficacy for managing behavior problems appear less impacted by caregiving stresses than those with lower self-efficacy (22). While self-efficacy (23) has been found to be positively associated with PA in a cross-sectional design, the associations of personal mastery with PA and NA have not been tested yet, neither has been tested for the associations of these two cognitive variables.

Drawing upon behavioral theories (24), strong support has been found for the role of frequency of engagement in pleasant events in the explanation of depressive symptoms. Higher levels of this variable have been longitudinally (25) and experimentally (26) associated with lower levels depression in family caregivers of people with dementia. The role of participating in activities has also been longitudinally associated with increases in PA but not in NA in a diary collection period study with caregivers (27).

However, despite the known associations between these variables and depressive symptoms, there are no longitudinal studies analyzing simultaneously the role of cognitive and behavioral correlates in depressive symptoms in caregivers, and none that examine the independent components of the affective experience, NA and PA.

The main objective of the present study was to analyze the combined longitudinal effects of cognitive variables (avoidant coping, personal mastery, and coping self-efficacy) and behavioral variables (frequency of engagement in pleasant events) on depressive symptoms and its independent components, PA and NA, in a sample of family caregivers of people with dementia in a 5-year longitudinal study. We further disaggregated within-person and between-person effects, which may be advantageous for more complete understanding of the stress-and-coping model. While between-person effects in our results would be more associated to differences between caregivers in our sample, within-person variation in coping variables could be more properly linked to within-person variation in depressive symptoms, PA, and NA across time. Drawing upon the reviewed studies (7), we hypothesized that while various stress and coping variables would significantly predict depressive symptoms, cognitive variables would be associated with NA and behavioral variables would be associated with PA.

Methods

Participants

Participants were 111 spousal dementia caregivers. All participants were enrolled in the University of California, San Diego (UC San Diego) Caregiver Study, which was designed, among other aims, to determine the extent to which chronic stress is associated with psychological and physical health. Inclusion criteria were a) to provide at least 20 weekly hours of in-home care for a spouse diagnosed of dementia and, b) being at least 55 years old. Although not a focus of this manuscript, a major focus of the larger study was to examine biological effects of stress on caregivers. Therefore, exclusion criteria were a) self-reporting a current diagnosis of serious illnesses (e.g., cancer) at baseline, b) to have experienced a stroke during the past 12 months, c) suffered from extreme hypertension (>200/120 mmHg), or d) taking medications that could affect any of the biomarkers assessed (e.g., Il-6). Participation could continue if conditions a or b were reported during the follow-up. Participants were recruited from local caregiver support groups, referrals from local caregiver agencies (e.g., the UC San Diego Alzheimer's Disease Research Center), from community health fairs, and through referrals from enrolled participants. The protocol was approved by the UC San Diego Institutional Review Board (IRB), and all participants provided written, informed consent prior to enrollment.

Procedure

The study was conducted employing a longitudinal design, with in-home assessments at enrollment and at 12, 24, 36, and 48 months after the baseline assessment. All face-to-face assessments were done by trained research staff, who interviewed participants about demographic characteristics and psychosocial variables. Over the course of the study, participants may have placed their spouses in residential settings. Despite these transitions,

participants were allowed to continue participation in the project and data from these post-transition timepoints are included in all analyses.

Measures

At the baseline assessment, participants provided sociodemographic information including age and gender. In addition, the following psychosocial variables were measured for caregivers:

Role Overload. The Role Overload scale (15) was used. This scale contains 4 items (e.g., "You have more things to do than you can handle"), with a 4-point Likert scale ranging from 0 ("Not at all") to 3 ("Completely").

Sleep Quality. The Pittsburgh Sleep Quality Index (within-pers) was used (28). This scale contains 19 items scoring for different aspects of sleep (e.g., sleep disturbances, sleep medication intake, sleep duration), composing a final sleep score, with higher scores indicating a poorer sleep quality.

Avoidance Coping. Caregivers were administered the avoidance coping subscale of the Revised Ways of Coping Questionnaire (29). The avoidance scale consists of 10 items assessing the caregiver's proclivity to response to an stimuli perceived as threatening by ignoring, distorting or escaping from it (e.g., "tried to forget the whole thing"). Respondents were asked the degree to which they used each of ten avoidance strategies over the past six months in dealing with stressful situations. Possible responses ranged from 0 ("never used") to 3 ("used a great deal").

Coping Self-efficacy. Participants completed the Coping Self-Efficacy Scale (30). This scale consists of 13-items assessing the caregiver's confidence that he/she can employ various coping strategies to manage stress (e.g., think of only one part of the problem). Response options ranged from 0 to 10 with 0 = "cannot do at all", 5 = "moderately certain can do", and 10 = "certain can do".

Personal Mastery. The Personal Mastery scale (15) was used to assess caregivers' sense of personal mastery. It consists of 7 items assessing participants' belief they can control life events and circumstances (e.g., "I can do just about anything I really set my mind to do"). Responses were given on a 4-point scale from "Strongly Agree" to "Strongly Disagree." Five items are reverse scored and items are summed to create an overall score (range = 7–28), with higher scores indicating greater sense of personal mastery.

Pleasant Events. Caregiver engagement in various pleasant events was assessed using a modified version of the Pleasant Events Schedule–AD (PES-AD) (31). This scale asked participants to indicate how much they engaged in 20 activities (e.g., "going on outings") over the past month. Response options were 0 = not at all, 1 = a few times (1–6 times), and 2 = often (7 or more times). A summary score was created by adding responses to the 20 items, with higher scores indicating greater engagement in pleasant activities.

Positive and Negative Affect. Caregivers completed the Positive and Negative Affect Schedule (PANAS), a 20-item scale consisting of mood adjectives (32). Ten items assess Positive affect (PA), such as "inspired" and ten items measure Negative Affect (NA), such as "upset". Participants rated each adjective based on how they felt over the past few weeks using a 5-point scale with responses ranging from 1 ("very slightly to not at all") to 5 ("extremely").

Depressive Symptoms. The short form of the Center for Epidemiologic Studies Depression scale (CESD-10) was used (33). This scale consists of 10 items asking for participant's experience of depressive symptoms during the past week (e.g., "I felt depressed"; "I felt lonely"). Response options ranged from 0 ("rarely or none of the time") to 3 ("most or almost all the time"). Scores over 10 in this scale are considered as indicators of clinically significant depressive symptoms (33).

Statistical Analyses

Three different linear mixed models were used, one for each of the dependent variables (depressive symptoms, PA and NA). All the models were fitted with a random intercept and used restricted maximum-likelihood (REML) estimation to handle missing data. Following the stress and coping model, predictors in the three models were sociodemographic data (caregivers' age and gender), stress (overload), and coping variables (mastery and coping self-efficacy, avoidant coping, and engagement in pleasant events). In addition, as a well-known predictor of depression, sleep quality (34) was also included in the model. We considered years of education as a predictor in our models but this variable was not associated with any of our outcomes measures (all p-values > .10) and was therefore excluded as a predictor. Within-person variables were time-varying and centered around each participant's personal mean. That is, each participant's personal mean score across time was subtracted from each of his/her yearly observations, with the objective of correlating personal change in predictors with change in our dependent variables. The following variables were used as within-person variables: Age, role overload, sleep quality, coping self-efficacy, personal mastery, avoidant coping, and pleasant events. Using age as a within-person variable meant that it was a linear variable and was identical to time in the model, allowing us to evaluate personal growth in dependent variables across the longitudinal study. Between-person variables were static across time, whereby they were group-mean-centered. That is, each participants' personal overall mean across the entire study was subtracted from the entire sample mean across the entire study. Use of between-person variables allows us to determine, for example, if male or female caregivers have more depressive symptoms across time, or if caregivers who use avoidant coping more consistently across time also have more depressive symptoms over time. The following were used as between-person variables in our models: Age, sex, role overload, sleep quality, coping self-efficacy, personal mastery,

avoidant coping, and pleasant events. Finally, to evaluate magnitude of effects, we used the formula described by Selya et al (35) to compute the Cohen's f^2 statistic for each variable in the respective models. As per Cohen's guidelines (36), small, medium, and large effect sizes are found at $f^2 \geq 0.02$, $f^2 \geq 0.15$, and $f^2 \geq 0.35$, respectively.

Results

Sample Characteristics

Complete sample characteristics over time are shown in Table 1. As it can be seen, the mean age of the sample at baseline was 74.5 years (SD = 7.9) and most participants were female (71.2%). A total of 43 participants (38.7%) reported clinically significant symptoms of depression. We conducted a series of t-tests to determine if missing data in the final year of the project (n = 62) was associated with participant characteristics (e.g., age, sex) and scores on all study variables. Mean scores from years 1-4 were computed for each variable for each subject, and t-tests compared these who had missing data in year 5 to those who did not. Results indicated that no demographic or questionnaire data was associated with missing data at year 5 (p-value range = .19-.94). Thus, we assumed missing data were missing at random. Baseline Pearson correlations among variables used in the study are presented in Table 2.

....TABLES 1 AND 2 ABOUT HERE..

Confirmation of the Tripartite Model

Prior to examining CESD, PA, and NA outcomes separately, we examined the multivariate longitudinal correlates between these constructs. We first conducted a linear mixed models analysis with CESD scores as the dependent variable and PA and NA as independent variables. In this model, both PA (t = -7.37, df = 407.21, p < .001) and NA (t = 9.52, df = 459.17, p < .001) emerged as significant correlates of depressive symptoms. We then examined the longitudinal association between PA and NA. Results indicated that these

constructs were not significantly correlated across time (t = -1.04, df = 440.57, p = .30),

providing evidence for the Tripartite model.

Depressive symptoms model

Unstandardized coefficients and their standard errors, along with the individual f^2

effect sizes of the full models for depressive symptoms, PA, and NA are shown in Table 3.

As depicted, within-person variability across the follow-up in sleep quality (*t* = 3.73, *df* =

101.78, p < .01), coping self-efficacy (*t* = -4.10, *df* = 360.15, p < .001), personal mastery (*t* =

-2.57, *df* = 360.29, p < .05), use of avoidance coping strategies (*t* = 2.59, *df* = 360.11, p <

.01), and engagement in pleasant activities (*t* = -3.11, *df* = 360.09, p < .01) showed a

significant association with variability in depressive symptoms. No significant effects were

found for within-person variability in age (*t* =-0.07, *df* = 360.27, *p* = .942) or role overload *(t*

= 1.69, *df* = 360.25, *p* = .093).

.....................................TABLE 3 ABOUT HERE..

When comparing between-person effects, differences in sleep quality (*t* = 3.73, *df* =

107.78, *p* < .01), coping self-efficacy (*t* = -4.52, *df* = 100, *p* <.01), personal mastery (*t* = -

3.54, *df* = 100.14, *p* <.01) and avoidance coping (t = 3.40, *df* = 100.44, *p* < .01) were

associated with between-person variation in depressive symptoms. No significant

associations were found for age (*t* = -1.32, *df* = 100.75, *p* = .191), gender *(t* = -0.82, *df* =

100.59, *p* = .416), role overload (*t* = 1.76, *df* = 102.81, *p* = .082), or engagement in pleasant

activities (*t* = -0.53, *df* = 102.20, *p* = .598). The inclusion of behavioral and cognitive

variables significantly improved the model beyond that only including only age, gender,

overload and sleep quality (χ2 (13) = 89.72, *p* < 0.001). The final model explained 61.22% of

the total variance of depressive symptoms; 28.66% of the within-person variance and 76.58%

of the between-person variance.

Positive affect model

Within-person variability in sleep quality (t = -2.59, df = 361.55, p < .05), coping self-efficacy (t = 4.52, df = 361.13, p < .01), and personal mastery (t = 3.08, df = 361.09, p < .01) showed significant associations with variability in PA. No significant effects were found for within-person changes in age (t = 1.19, df = 361,10, p = .235), role overload (t = 0.18, df = 361.12, p = .854), avoidance coping (t =0.78, df = 360.99, p = .439), or engagement in pleasant events (t = 1.08, df = 361.16, p = .282).

When examining between-person associations, differences in role overload (t = 3.28, df = 104.19, p < .001), coping self-efficacy (t = 4.43, df = 102.30, p < .01), and personal mastery (t = 4.09, df = 102.42, p < .01) showed significant relationships with between-person variation in PA. No significant between-person associations with PA were found for age (t = -0.92, df = 102.78, p = .359), gender (t = 0.16, df = 102.86, p = .876), sleep quality (t = -1.16, df = 103.67, p = .249), avoidance coping (t = 0.78, df = 102.57, p = .437) or engagement in pleasant events (t = 1.70, df = 104.21, p = .091). The inclusion of behavioral and cognitive variables significantly improved the model beyond that only including age, gender, role overload and sleep quality ($\chi2$ (13) = 68.60, p < 0.001). The final model explained 40.41% of the overall variance in PA; 14.74% of the within-person variance and 51.06% of the between-person variance.

Negative affect model

Within-person changes in age (t = -2.60, df = 360.80, p < .01), role overload (t = 2.72, df = 360.84, p < .01), sleep quality (t = 2.65, df = 361.57, p < .01), coping self-efficacy (t = -3.74, df = 360.85, p < .01), personal mastery (t = -2.10, df = 360.79, p < .05), use of avoidance coping (t = 2.87, df = 360.63, p < .01), and engagement in pleasant events (t = -2.60, df = 360.90, p < .01) were associated with variability in NA.

When examining between-person variation, differences in sleep quality (t = 2.96, df = 103.45, p < .01), coping self-efficacy (t = -4.07, df = 101.23, p < .01), and avoidant coping (t

= 4.93, df = 101.71, $p < .01$) showed significant associations with between-person differences in NA. No significant associations were found for age (t = -0.10, df = 102.06, p = .919), gender (t = -1.37, df = 102.13, p = .173), role overload (t = 1.27, df = 104.70, p = .207), personal mastery (t = -1.37, df = 101.43, p = .174), or pleasant events (t = 0.84, df = 104.02, p = .405). The inclusion of behavioral and cognitive variables significantly improved the model beyond that only including only age, gender, overload and sleeping quality ($\chi2$ (13) = 67.70, $p < 0.0001$). The final model explained 51.52% of the overall variance in NA; 27.86% of the within-person variance and 67.98% between-subjects.

Discussion

The objective of this study was to analyze the possible longitudinal effects of various cognitive and behavioral variables (i.e., self-efficacy, personal mastery, avoidance coping, and engagement in pleasant events) on caregivers' depressive symptoms as well as both PA and NA. As expected, different coping strategies demonstrated differential associations with PA and NA.

The results are partially consistent with our hypotheses and prior literature. The use of avoidance coping was associated with increased NA and depressive symptoms (37-40) and not with PA, across the study period, both at within-person and between-person levels. This result is consistent with stress and coping theories which posit that use of avoidance coping may be used to distract attention away from negative events or circumstances with the goal of helping resolve acute negative mood symptoms, but with the actual result of magnifying negative emotional states and having no long-term impact on positive emotional states (16). The results for avoidance coping then are also consistent with the previous cross-sectional study (7), in which cognitive variables (negative appraisals) were associated with NA but not with PA in dementia caregivers.

The obtained findings regarding the other assessed cognitive variables, however, are not as consistent with those of Mausbach et al. (7). Coping self-efficacy and personal mastery seemed to behave in a more non-specific way than avoidant coping, especially in the case of within-person changes across time. The results suggest that these two variables have a more transversal role, showing associations with both PA and NA, along with depressive symptoms. These results support the notion that obtaining a high self-perception of one's skills and capacities to deal with day-a-day problems may lead caregivers to a better mood state, not only in terms of lowering depressive symptoms, but also feeling higher levels of PA and lower levels of NA.

Regarding engagement in pleasant activities, a notable and unexpected finding was that neither between- nor within-person variability in pleasant events across time were significantly associated with variability in PA. In contrast, greater engagement in pleasant activities had significant negative associations with both NA and depressive symptoms, which is contrary to prior cross-sectional research showing that pleasant events were uniquely associated with PA but not NA (7), but consistent with cognitive-behavioral theory (41, 42) whereby increasing engagement in positive activities is believed to result in a reduction in depressive symptoms. This may suggest that, for caregivers, engaging more in pleasant activities across time may help on decreasing negative feelings, but not so much on increasing positivity and feelings of joy. However, neither of these associations were found in between-person effects, suggesting that the effects of the individual differences in depressive symptoms, PA or NA may be better explained by other variables (e.g., avoidance coping).

It should be noted that all of the significant within-person effect-sizes were small in magnitude, suggesting that changing these variables via intervention may have modest impact on caregivers' emotional well-being. However, a few of the between-person effects were medium in magnitude, including the effect of self-efficacy, personal mastery, and avoidant

coping on depressive symptoms. These findings suggest that caregivers may benefit from early-phase caregiving interventions that seek to minimize use of avoidant coping strategies while bolstering caregivers' sense of confidence in their ability to successfully cope with the challenges of caregiving. Targeting these coping strategies early in the caregiving role may mitigate the onset of depressive symptoms across time and decrease the need to reduce depression later in the caregiving process.

Despite its strengths, this study is not without limitations. First, we made use of a convenience sample, which prevents us from generalizing the results to the broader caregiver population. In addition, while nearly 40% of our sample reported clinically significant symptoms of depression, the sample size was not sufficient to compare the effects of coping variables in those with clinically significant symptoms vs those without. We suggest future research consider examining these effects. Secondly, despite the longitudinal design of the study, its results should not be interpreted as causal. Additional experimental designs are needed to confirm the results. Third, even though we included an important variety of coping styles and personal resources, taking into consideration the ones with a stronger empirical support, some other resources and variables not included in the model like cultural variables (14) may also be playing an important role in the caregiving stress process.

Notwithstanding these limitations, the findings of this study have potential public health significance. To our knowledge, this is the first study to examine these variables together in a comprehensive longitudinal model analyzing differential association with depressive symptoms, PA, and NA. The results of the current study suggest that measuring the associations of coping variables with PA and NA separately, instead of depressive symptoms alone, may be useful for understating how the stress and coping process (14) affect caregivers' psychological health.

Authors Contributions: Igor Grant and Brent Mausbach designed the study and assisted in writing the manuscript. Carlos Vara Garcia and Brent Mausbach carried out the statistical analyses and Carlos Vara Garcia contributed to the writing of the manuscript. Rosa Romero-Moreno supervised the statistical analyses and assisted with writing the manuscript. Andrés Losada-Baltar and Dilip Jeste assisted with writing the manuscript.

References

1.   Pinquart M,Sörensen S: Differences between caregivers and noncaregivers in psychological health and physical health: A meta-analysis. Psychol Aging 2003; 18:250-267

2.   Mausbach BT, Chattillion EA, Roepke SK, et al: A comparison of psychosocial outcomes in elderly Alzheimer caregivers and noncaregivers. Am J Geriatr Psychiatry 2013; 21:5-13

3.   Collins B,Kishita N: Prevalence of depression and burden among informal caregivers of people with dementia: a meta-analysis. Ageing Soc 2020; 40:2355-2392

4.   Watson D, Weber K, Assenheimer JS, et al: Testing a tripartite model: I. Evaluating the convergent and discriminant validity of anxiety and depression symptom scales. J Abnorm Psychol 1995; 104:3-14

5.   Watson D, Clark LA,Carey G: Positive and negative affectivity and their relation to anxiety and depressive disorders. J Abnorm Psychol 1988; 97:346-353

6.   Watson D,Clark LA: Measurement and mismeasurement of mood: recurrent and emergent issues. J Pers Assess 1997; 68:267-296

7.   Mausbach BT, Roepke SK, Depp CA, et al: Specificity of cognitive and behavioral variables to positive and negative affect. 2009; 47:608-615

8.   Schmukle SC, Egloff B,Burns LR: The relationship between positive and negative affect in the Positive and Negative Affect Schedule. J Res Pers 2002; 36:463-475

9.   Peng HL,Chang YP: Sleep disturbance in family caregivers of individuals with dementia: a review of the literature. Perspect Psychiatr Care 2013; 49:135-146

10.   McCurry SM, Logsdon RG, Teri L, et al: Sleep disturbances in caregivers of persons with dementia: contributing factors and treatment implications. Sleep Med Rev 2007; 11:143-153

11.   von Kanel R, Mausbach BT, Ancoli-Israel S, et al: Positive affect and sleep in spousal Alzheimer caregivers: a longitudinal study. Behav Sleep Med 2014; 12:358-372

12.   Vitaliano PP, Scanlan JM, Zhang J, et al: A path model of chronic stress, the metabolic syndrome, and coronary heart disease. Psychosom Med 2002; 64:418-435

13.   Lazarus RS,Folkman S: Stress, appraisal, and coping, New York, Springer, 1984

14.   Knight BG,Sayegh P: Cultural values and caregiving: the updated sociocultural stress and coping model. J Gerontol B Psychol Sci Soc Sci 2010; 65B:5-13

15.   Pearlin LI, Mullan JT, Semple SJ, et al: Caregiving and the stress process: An overview of concepts and their measures. Gerontologist 1990; 30:583-594

16.   Kim JH, Knight BG,Longmire CV: The role of familism in stress and coping processes among African American and White dementia caregivers: effects on mental and physical health. Health Psychol 2007; 26:564-576

17.   Pearlin LI,Schooler C: The structure of coping. J Health Soc Behav 1978; 19:2-21

18.   Mausbach BT, Patterson TL, Von Känel R, et al: The attenuating effect of personal mastery on the relations between stress and Alzheimer caregiver health: A five-year longitudinal analysis. Aging Ment Health 2007; 11:637-644

19.   Bandura A: Self-efficacy: The exercise of control, New York, W. H. Freeman, 1997

20.   Gilliam CM,Steffen AM: The relationship between caregiving self-efficacy and depressive symptoms in dementia family caregivers. Aging Ment Health 2006; 10:79-86

21.   Steffen AM, Gallagher-Thompson D, Arenella KM, et al: Validating the Revised Scale for Caregiving Self-Efficacy: A Cross-National Review. Gerontologist 2019; 59:e325-e342

22.   Rabinowitz YG, Mausbach BT,Gallagher-Thompson D: Self-efficacy as a moderator of the relationship between care recipient memory and behavioral problems and caregiver depression in female dementia caregivers. Alzheimer Dis Assoc Disord 2009; 23:389-394

23.   Braithwaite V: Between stressors and outcomes: can we simplify caregiving process variables? Gerontologist 1996; 36:42-53

24.   Lewinsohn PM,Graf M: Pleasant activities and depression. J Consult Clin Psychol 1973; 41:261-268

25.   Romero-Moreno R, Marquez-Gonzalez M, Mausbach BT, et al: Variables modulating depression in dementia caregivers: a longitudinal study. Int Psychogeriatr 2012; 24:1316-1324

26.   Moore RC, Chattillion EA, Ceglowski J, et al: A randomized clinical trial of Behavioral Activation (BA) therapy for improving psychological and physical health in dementia caregivers: Results of the Pleasant Events Program (PEP). Behav Res Ther 2013; 51:623-632

27.   Mausbach BT, Coon DW, Patterson TL, et al: Engagement in activities is associated with affective arousal in Alzheimer's caregivers: A preliminary examination of the temporal relations. Behav Ther 2008; 39:366-374

28.   Buysse DJ, Reynolds CF, Monk TH, et al: The Pittsburgh Sleep Quality Index: A new instrument for Psychiatric practice and research. Psychiatr Res 1989; 28:193-213

29.   Vitaliano P, Russo J,Carr JE: The Ways of Coping Checklist: Revision and psychometric properties. Multivariate Behav Res 1985; 20:3-26

30.   Chesney MA, Neilands TB, Chambers DB, et al: A validity and reliability study of the coping self-efficacy scale. Br J Health Psychol 2006; 11:421-437

31.   Logsdon RG,Teri L: The Pleasant Events Schedule-AD: Psychometric properties and relationship to depression and cognition in Alzheimer's disease patients. Gerontologist 1997; 37:40-45

32.   Watson D, Clark LA,Tellegen A: Development and validation of brief measures of positive and negative affect: The PANAS scales. J Pers Soc Psychol 1988; 54:1063-1070

33.   Andresen EM, Malmgren JA, Carter WB, et al: Screening for depression in well older adults: Evaluation of a short form of the CES-D. Am J Prev Med 1994; 10:77-84

34.   Cole MG,Dendukuri N: Risk Factors for Depression Among Elderly Community Subjects: A Systematic Review and Meta-Analysis. Am J Psychiatry 2003; 160:1147-1156

35.   Selya AS, Rose JS, Dierker LC, et al: A Practical Guide to Calculating Cohen's f(2), a Measure of Local Effect Size, from PROC MIXED. Front Psychol 2012; 3:111

36.   Cohen J: Statistical Power Analysis for the Behavioral Sciences, Hillsdale, NJ, Lawrence Erlbaum Associates, 1988

37.   Penley JA, Tomaka J,Wiebe JS: The association of coping to physical and psychological health outcomes: a meta-analytic review. J Behav Med 2002; 25:551-603

38.   Losada A, Marquez-Gonzalez M, Romero-Moreno R, et al: Development and validation of the Experiential Avoidance in Caregiving Questionnaire (EACQ). Aging Ment Health 2014; 18:897-904

39.   Marquez-Gonzalez M, Cabrera I, Losada A, et al: Attentional avoidant biases as mediators in the association between experiential avoidance and blood pressure in dementia family caregivers. Aging Ment Health 2018; 22:669-677

40.   Holahan CJ, Moos RH, Holahan CK, et al: Stress generation, avoidance coping, and depressive symptoms: a 10-year model. J Consult Clin Psychol 2005; 73:658-666

41.   Jacobson NS, Dobson KS, Truax PA, et al: A component analysis of cognitive-behavioral treatment for depression. J Consult Clin Psychol 1996; 64:295-304

42.   Lewinsohn PM: A behavioral approach to depression, in The Psychology of Depression: Contemporary Theory and Research. Edited by Friedman RJ,Katz MM. New York, John Wiley & Sons, 1974, pp 157-178

Table 1. Characteristics of the sample over time

Variable	Baseline (N=111)			1st year (N=110)			2nd year (N=109)			3rd year (N=100)			4rd year (N=62)		
	M (SD)	n (%)	Range	M (SD)	n (%)	Range	M (SD)	n (%)	Range	M (SD)	n (%)	Range	M (SD)	n (%)	Range
Caregivers' age	74.6 (7.9)		55-90	75.4 (7.7)		56 - 90	76.4 (7.9)		57-92	77.7 (7.9)		58 – 93	78.8 (7.6)		61 - 92
Gender (female)		79 (71.2)													
Depressive Symptoms	8.6 (5.8)		0-24	8.3 (6.0)		0 - 27	7.5 (6.1)		0 – 23	8.1 (6.2)		0 - 24	7.7 (5.8)		18 - 47
Clinically significant depressive symptoms		43 (38.7)			39 (35.1)			35 (31.5)			36 (32.4)			16 (36.7)	
Positive Affect	32.1 (7.4)		10-50	31.1 (7.1)		13 - 49	31.9 (7.7)		10 – 50	32.2 (7.4)		11 - 50	33.1 (6.8)		18 - 47
Negative Affect	17.6 (5.7)		10-36	16.6 (5.6)		10 - 32	15.9 (7.0)		10 – 46	15.9 (5.6)		10 - 32	15.3 (5.9)		10 – 33
Sleep quality	6.6 (3.5)		0-17	6.2 (3.5)		1 – 18	6.5 (3.3)		0 – 15	6.1 (3.8)		0 – 17	5.9 (3.5)		1 – 15
Role overload	5.2 (3.2)		0-12	4.3 (3.0)		0 – 12	4.0 (2.9)		0 – 12	3.9 (2.9)		0 – 11	3.4 (2.7)		0 – 11
Coping Self-Efficacy	91.0 (19.9)		48-130	91.3 (19.9)		49 - 130	90.5 (21.2)		10 – 130	90.0 (19.8)		20 – 130	91.2 (20.1)		40 - 129
Personal Mastery	11.5 (3.4)		0-21	11.8 (3.5)		1 – 21	12.4 (3.3)		4 – 21	13.1 (3.6)		4 - 21	13.2 (3.7)		3 – 21
Avoidant Coping	7.5 (4.1)		0-23	7.1 (3.5)		0 – 17	6.9 (3.8)		0 – 18	8.0 (4.3)		0 - 18	5.6 (3.8)		0 – 16
Pleasure Events	55.5 (11.8)		23-76	57.7 (11.4)		30 - 76	55.8 (14.1)		11 - 80	50.1 (14.1)		7 - 76	50.1 (13.5)		23 – 80

Table 2. Pearson correlations among variables at baseline (n = 111)

Variable	1.	2.	3.	4.	5.	6.	7.	8.
1. CES-D	--							
2. NA	.70*	--						
3. PA	-.54*	-.27*	--					
4. Overload	.49*	.42*	-.14	--				
5. PSQI	.43*	.39*	-.25*	.34*	--			
6. Self-Efficacy	-.60*	-.57*	.46*	-.31*	-.30*	--		
7. Mastery	-.55*	-.51*	.28*	-.46*	-.29*	.43*	--	
8. Avoidant Coping	.54*	.50*	-.14	.31*	.19*	-.41*	-.43*	--
9. Pleasant Events	-.27*	-.15	.30*	-.27*	-.13	.31*	.27*	-.15

Note. * p<.05.

Table 3. Linear mixed models for depressive symptoms, positive affect and negative affect.						
	Depressive Symptoms Full Model	f^2	Positive Affect Full Model	f^2	Negative Affect Full Model	f^2
	B (SE)		B (SE)		B (SE)	
Intercept	7.92		32.57		16.67	
Level 1 (within subjects)						
Age	-0.01 (0.12)	0.00	0.19 (0.16)	0.00	-0.37 (0.14)**	0.02
Role Overload	0.14 (0.08)	0.01	0.02 (0.10)	0.00	0.25 (0.09)**	0.02
Sleep quality	0.44 (0.08)**	0.08	-0.26 (0.10)*	0.02	0.24 (0.09)**	0.02
Coping self-efficacy	-0.05 (0.01)**	0.04	0.08 (0.02)**	0.05	-0.06 (0.2)**	0.04
Personal Mastery	-0.19 (0.07)*	0.02	0.29 (0.10)**	0.02	-0.18 (0.09)*	0.01
Avoidant coping	0.14 (0.06)**	0.02	0.06 (0.07)	0.00	0.18 (0.06)**	0.02
Pleasant events	-0.15 (0.05)**	0.02	0.07 (0.06)	0.00	-0.14 (0.05)**	0.02
Level 2 (between subjects)						
Age	-0.05 (0.04)	0.01	-0.06 (0.06)	0.00	-0.00 (0.04)	0.00
Female	-0.51 (0.62)	0.00	-0.16 (1.06)	0.00	-0.96 (0.70)	0.01
Role Overload	0.27 (0.15)	0.03	0.85 (0.26)**	0.11	0.22 (0.17)	0.01
Sleep quality	0.35 (0.09)**	0.18	-0.19 (0.16)	0.00	0.32 (0.11)**	0.10
Coping self-efficacy	-0.10 (0.02)**	0.26	0.16 (0.04)**	0.19	-0.10 (0.03)**	0.20
Personal Mastery	-0.46 (0.13)**	0.15	0.91 (0.22)**	0.18	-0.04 (0.15)	0.01
Avoidant coping	0.36 (0.11)**	0.14	0.14 (0.18)	0.00	0.59 (0.12)**	0.31
Pleasant events	-0.04 (0.08)	0.00	0.22 (0.13)	0.02	0.07 (0.09)	0.01
$\sigma 2$ (Within Subjects)	8.19 (0.61)		13.65 (1.02)		11.11 (0.83)	
$\tau 00$ (Between subjects)	5.70 (1.09)		18.87 (3.09)		7.09 (1.37)	
Pseudo-R^2 Within	29.27%		14.26%		24.88%	
Pseudo-R^2 Between	76.58%		50.88%		67.52%	
Pseudo-R^2 Total	61.65%		40.15%		50.30%	

Note. p-values are from t-tests. The range of df values is 100.0-360.9 for depressive symptoms, 102.3-361.6 for positive affect, and 101.2-361.6 for negative affect. * = p<.05, ** = p<.01. f^2 = Cohen's f-squared statistic ($f^2 \geq 0.02$ = small, $f^2 \geq 0.15$ = medium, and $f^2 \geq 0.35$ = large effect) CESD = Center for Epidemiologic Studies – Depression scale. PA = Positive Affect. NA = Negative Affect.