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Caregiver Burden in Alzheimer's Disease: Cross Sectional and Longitudinal Patient Correlates

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Abstract

Objectives—Alzheimer disease (AD) imposes a severe burden upon patients and their caregivers. Although there is substantial evidence of the adverse impact of burden, considerably less is known about its specific correlates and potential causes.

Design—We use data from the Clinical Antipsychotic Trials of Intervention Effectiveness (CATIE)-AD study to examine the relationship of burden and depression among AD caregivers to patient and caregiver sociodemographic characteristics, patients' cognitive status, psychiatric and behavioral symptoms, functional abilities, quality of life, and intensity of care provided by caregivers.

Setting—CATIE-AD included outpatients in usual care settings, and assessed treatment outcomes over nine-months.

Participants—Data were examined from 421 ambulatory outpatients with a diagnosis of dementia of the Alzheimer's type or probable AD with agitation or psychosis.

Measures—The Burden Interview, the Beck Depression Inventory, and the Caregiver Distress Scale were used to evaluate caregiver burden.

Results—More severe psychiatric and behavioral problems and decreased patient quality of life, as well as lower functional capability were significantly associated with higher levels of burden and depression among caregivers at baseline. Six month changes showed that decreased symptoms and improved quality of life were associated with decreased burden and accounted for most of the explained variance in change in burden measures.

Conclusion—Severity of psychiatric symptoms, behavioral disturbances and patients' quality of life are the main correlates of caregivers' experience burden. Psychosocial and pharmacologic interventions targeting these two aspects of the disorder are likely to not only alleviate patient suffering but also promote caregiver well-being.

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Keywords

Caregivers Burden; Alzheimer's Disease; Antipsychotics

Alzheimer's disease (AD) is a costly and debilitating illness that affects an estimated 5 to 8 million Americans (1). By mid century, the number of individuals suffering from AD is expected to double, as will the cost of their care. AD imposes a severe burden not only upon patients but also their relatives, particularly those directly responsible for their care.

Caregivers are often subject to enormous stressors (2–4) and are at high risk for depression (5–9) with nearly half of caregivers in some studies meeting formal diagnostic criteria for depression (10–12). Caregivers also show increased utilization of health services (13, 14) and psychotropic medications (15, 16), and one study reported that caregivers who reported distress were 63% more likely than non-caregivers to die within 4 years. (17). Adverse effects of care giving thus seem to be especially pronounced among dementia caregivers. even after controlling for intensity of care giving involvement (18).

Psychiatric symptoms among caregivers are also associated with increased likelihood of *patient* nursing home placement (19), perhaps because such symptoms heighten felt burden which, in turn, increases impatience, and underestimation of the patient's actual functional incapacity (20). Caregiver burden should thus be viewed as an important target for successful interventions because it impacts the well-being of both AD patients and their caregivers. Although there is substantial evidence of the adverse psychiatric and physical impact of caregiving and its correlates in dementia (21), considerably less is known about specific causes and cross sectional, and longitudinal correlates of caregivers perceived burden in AD patients. Among the factors of potential relevance are sociodemographic characteristics of both patients and caregivers, the specific relationship of the patient and the caregiver, the frequency and severity of patients' psychiatric symptoms and behavioral disturbances, the degree of cognitive impairment, their quality of life and functional status, and the amount of help required with activities of daily living. Successful management of caregiver distress will be facilitated by a more complete understanding of the specific factors that are associated with increased burden.

Care givers' characteristics such as age, income, and employment status have also been correlated with experiences of burden (22, 23) as has the nature of the family relationship (24–26). While some studies have suggested that caregiver burden is not strongly related to the severity of patients symptoms (24, 27, 28) others have found that the level of patient behavioral disturbance is an important determinant of increased burden (29, 30) and that the relationship of burden to behavioral disturbances is stronger than to cognitive dysfunction (20). With regard to the relationship of functional impairment and burden, reports have also been inconsistent (6, 14, 15, 29).

In this report, we examine three measures of burden among AD caregivers, one that directly measures caregivers' burden, one that assesses caregivers' depressive symptoms, and one that addresses caregiver symptoms related distress. We examine the relationship of these three measures to both patient and caregiver sociodemographic characteristics, to measures of patients' cognitive status, psychiatric and behavioral symptoms, functional abilities, quality of life, and to the intensity of care provided by caregivers as reflected in the number of tasks they assist with and the time spent assisting and supervising patients as well as the amount of time patients have recently spent in institutional settings (hospitals or nursing homes). Identification of potential clinical correlates of caregiver burden is important to

identify targets for both pharmacologic and psychosocial interventions that will both directly benefit patients and mediate benefits for their caregivers.

Methods

Study Design

We use data from the Clinical Antipsychotic Trials of Intervention Effectiveness (CATIE)-AD study, a large NIMH-funded, randomized controlled trial designed to compare the effectiveness of antipsychotic medications and placebo in patients with AD and psychosis or agitated/aggressive behavior at 42 U.S. sites. The study was reviewed and approved by the Institutional Review Board (IRB) at each site. Written informed consent was obtained from the patients or their legally authorized representatives and from the partners or caregivers who participated with the patients. Details of the study design and entry criteria have been presented elsewhere (31, 32). The current study relies on data collected at baseline, and 3, 6 and 9 months after randomization, the time points at which data on the variables of interest were collected

Measures

Caregiver burden—The Burden Interview (33), a widely used 22-item assessment tool for measuring caregivers' perceived burden from providing care in areas commonly reported by caregivers as problematic such as physical health, psychological well being, finances, and their relationship with the patient. Items are answered on a five-point scale ranging from 0= never to 4 = nearly always. Scores are added to give total score ranges from zero to 88, with higher scores implying greater perceived caregiver burden;

Caregiver Depression—The Beck Depression Inventory (34) includes 21 questions, with each response scored on a scale from 0 to 3. Higher total scores indicate more severe depressive symptoms.

Caregiver Distress—The Caregiver Distress Scale, is a composite of the scores based on the distress items of the Neuropsychiatric Inventory (NPI) described in greater detail below (35).

Psychiatric and behavioral symptoms of the patient were assessed with the Brief Psychiatric Rating Scale (BPRS; (36, 37), in which a 7 point Likert scale is used to measure the severity of 18 psychiatric and behavioral symptoms. Symptoms were also measured with the NPI (35), a measure of the frequency and severity of 12 psychiatric symptoms over the previous month, based on structured interviews with caregivers. The items assess delusions, hallucinations, agitation/aggression, depression/dysphoria, anxiety, elation, apathy/indifference, disinhibition, irritability/lability, aberrant motor behavior, sleep disturbance, and appetite and eating disorder. Caregivers rate each symptom, if present, in terms of both frequency (1 to 4) and severity (1 to 3) and indicate their own distress for each symptom on a scale from 0 (not distressing at all) to 5 (extremely distressing). The NPI symptom score is calculated by multiplying the scores for severity and frequency which gives scores between 1 and 12 inclusive if a symptom is present and a score of 0 if a symptom is absent.

The Cornell Scale for Depression in Dementia (CSDD) (38) was used to measure mood symptoms, ideational disturbances of depression, and neurovegetative signs in the AD patients. Items are rated based on patient report, caregiver report, and the rater's observations of the patient.

Cognitive functioning—Cognitive functioning was assessed with: 1) The Mini Mental State Examination (MMSE) (39), a brief 30-item measure of global cognitive ability and 2) the AD Assessment Scale – Cognitive Subscale (ADAS-Cog), an 11-item assessment of memory, language, visuoconstructive skill, and ideational praxis (40).

Activities of daily living—The AD Cooperative Study – Activities of Daily Living Scale (ADCS-ADL) (41), a 23-item, hierarchically-scaled inventory of basic (e.g., eating, toileting, bathing) and instrumental (e.g., using the telephone, going shopping) functional skills and abilities based on an informant's observations. The overall score ranges between zero (worst performance) and 78 (best performance).

Quality of life—The Alzheimer's Disease Related Quality of Life (ADRQL) (42)) measures health-related quality of life in patients with AD, based on a structured interview with the caregiver. Items assess behaviors that reflect social interaction, maintained interests, participation in activities, cheerfulness, and freedom from distress.

Intensity of care—The Dependence Scale (43) is a 13-item measure of the amount of caregiver assistance needed by the patient to accomplish daily activities. Based on the Dependence Scale interview with the caregiver, the patient's Equivalent Institutional Care (EIC) level was derived as follows: Level 1= Limited home care (needs some help with activities such as shopping or housekeeping); Level 2= Supervised adult home care (supervised setting with constant companionship and regular help with cooking and housekeeping); Level 3= Health-related facility 24-hour supervision for personal care and safety). The Caregiver Activity Scale (44), represents the total time that the caregiver spends providing assistance for a patient over the past 24 hours in five care-need domains: using transportation, dressing, eating, looking after one's appearance, and general supervision. Caregiving time for the four specific domains, excluding general supervision was also calculated. A final measure based on a series of questions reflecting service use in the previous 30 days indicated whether the patient spent at least half of that time (15 of the previous 30 days) in a residential setting, i.e. hospital or nursing home.

Analyses

Pearson product-moment correlations were used to evaluate the bivariate associations between the three measures of caregivers' burden at baseline and baseline measures of patient and caregiver sociodemographic characteristics, cognitive status, psychiatric and behavioral symptoms, quality of life, and intensity of care giving as reflected by the time spent assisting and supervising patients and time in instructions. Data in these bivariate analyses were from the baseline observations only.

Variables that were significantly related to measures of caregiver burden were then entered into a forward stepwise multiple regression analysis to create the most parsimonious model and to identify those variables that are most strongly and independently related to the measures of caregiver burden and depression. Standardized regression coefficients were calculated to allow assessment of the strength of independent associations and incremental r-square to represent the additional proportion of variance explained by each added variable.

We then examined the bivariate association between change in burden measures over 6 months and, change in patients' psychiatric symptoms and behavioral problems, functional abilities, quality of life, and care needs (a change-and-change analysis) over the same period of time. For these analyses we constructed an additional set of measures in which the baseline score on each measure for each subject was subtracted from the six month follow-up scores.

Finally, 6-month change measures that were significantly correlated with 6-month change in measures of burden on bivariate analysis were entered into a second set of forward stepwise multiple regression analyses to again determine the most parsimonious model and identify variables most strongly and that were independently related to change in the measures of caregivers burden and depression and how much of the variance in change in burden would be accounted for by changes in these measures. To decrease risk of type I error and spuriously significant associations, level of statistical significance was set for $p < 0.01$

Results

Sample Characteristics

Subjects were 421 ambulatory outpatients with a diagnosis of dementia of the Alzheimer's type (DSM-IV, (45)) or probable AD (46) on the basis of the history, physical examination, results of structural brain imaging, and the score on the Mini-Mental State Examination (MMSE). Mean age of patients was 77.9 ± 7.5 , 56% were females and they were mostly Caucasian (79.9%). Baseline clinical characteristics of the patients are shown in Table 1. Fifty-seven percent of patients required a level of care equivalent to that given in assisted-living facilities, and 17% needed the equivalent of nursing home care.

Fifty-two percent of caregivers were spouses, and 33% were children or sons-in-law or daughters-in-law. Caregivers were middle aged or older (mean age = 63.0 ± 15.5), 73.5 years for spouses and 51.2 years for children or their spouses, primarily females (70%), and mainly Caucasian (78.8%) (Table 1). The mean score on the burden interview was 34.4 ± 16.0 , above the cut off score of 24 for caregivers who are at risk for depression (47).

Bivariate Analyses

Published Cronbach's alphas, reflecting internal reliability consistency, of the three burden measure range from 0.8 for the Burden Interview to 0.9 for the BDI. The three measures were moderately correlated with each other (r ranged from 0.43 between caregivers' distress and depression to 0.58 between depression and burden) indicating related but distinct aspects of the same construct. All three burden measures were also correlated with symptoms with correlation coefficients ranging from 0.18 to 0.32 for the BPRS, 0.34 to 0.74 for the NPI, and 0.27 to 0.45 for the Cornell Scale for Depression (Table 2).

Patient quality of life was significantly and moderately correlated with all three measures of burden ranging from (0.30 to 0.44), while functional capacity was weakly correlated with burden ($r = -0.11 - 0.19$). The only measure of care needs that showed significant association with caregivers distress was the Caregivers Activity Scale (CAS), the measure of the time caregivers spend assisting or supervising patients with daily activities. None of the burden measures showed significant correlation with the cognitive measures (Table 2). Nor were the patient's sociodemographic variables significantly correlated with any of the burden measures. With regard to caregivers' characteristics, education was the only variable that was significantly, although weakly, correlated with caregivers' distress (Table 2).

Stepwise Regression

Variables with significant correlations with each of the burden measures were entered into three separate stepwise multiple regression models. Because the Distress Scale is a subscale of the NPI, the NPI was not entered in the regression model for that scale. Only neuropsychiatric symptoms and quality of life entered all models and predicted the majority of the variance in the three burden measures. Severity of depressive symptoms was also a significant predictor of caregivers' distress (Partial $R^2 = 0.20$) (Table 3).

Patients' functional abilities were excluded from the model, thus this data offered no evidence of association between activities of daily living and caregivers' perception of burden.

Correlation of Measures of Change

Similar to the bivariate correlations between baseline scores, changes in the three burden measures from baseline to follow up were moderately strongly intercorrelated (r 0.26 – r 0.43).

Changes in symptoms and behavioral problems were significantly and positively associated with changes in caregivers' perception of burden and in their depressive symptoms (Table 4). The correlations of change in the NPI symptom scores with the change in burden measure ranged from 0.23 with the BDI to 0.43 with the burden Interview. The correlation of change in the CSDD (patient depression measure) and in the burden measure ranged from 0.18 with the BDI (caregiver depression measure) to 0.37 with the NPI caregivers' distress scale. Change in quality of life was negatively associated with significant change in caregiver's perceived burden as increased quality of life was associated with reduced burden. Change in the MMSE was significantly but only weakly associated with change in caregivers' distress associated with symptoms.

Variables with significant correlations with change in any of the burden measures in bivariate analyses were entered into three separate stepwise multiple regression models (although change in the NPI symptoms was not entered in the regression model with the NPI caregiver Distress Scale).

Six month changes in symptoms predicted most of the explained variance in the change in burden measures. For example, the NPI symptom score predicted changes in both caregivers' burden and depression (Partial $R^2 = 0.11 - 0.19$). Changes in the other two symptoms measures (BPRS and CSDD) were also significantly associated with changes in the NPI Caregivers Distress scores (Partial $R^2 = 0.04$ and 0.02). However, the correlation between the change in the CSDD and changes in the NPI Caregivers Distress scores was notably small. Change in patients' quality of life and MMSE predicted small amount of variance in burden and distress albeit inconsistently (Table 5).

Discussion

This study differed from previous studies in that it used a large data set from a *recent* clinical trial to simultaneously examine both the cross-sectional and longitudinal relationship of measures of caregiver burden to multiple measures both patient and caregiver sociodemographic characteristics, clinical status and functioning. We found consistent relationships between measures of perceived burden and depression among care givers and patients' psychiatric and behavioral symptoms and quality of life, but only limited relationships to cognitive function and activities of daily living. More importantly, this study reports significant relationships between changes in patient symptoms and behavioral problems at six month follow up and changes in caregiver burden, and identified patient factors that account for most of the explained variance in change in all three measures of caregiver burden. This finding is unique to this study and it highlights the importance of developing interventions that specifically target these behavioral symptoms.

Our findings that more severe psychiatric and behavioral problems, along with decreased quality of life were all significantly associated with higher levels of burden and depression among caregivers are consistent with findings of other studies (29, 30) and replicate earlier suggestions that burden may be related more to behavioral disturbances and social

dysfunction than to cognitive deficits (20, 49). Some studies have also identified the particular family relationship of the patient and the caregiver as associated with different experiences of burden of (24–26). In our sample, being a spouse was also found to be associated with heightened perception of burden. Our finding that changes in behavioral problems at follow up was associated with change in caregivers burden contributes significantly to the literature in this area and points to the potential amenability of caregiver burden to treatments that are effective in ameliorating patients' behavioral disturbances.

As informal caregivers play such a crucial role in the care of AD patients, development of appropriate management strategies that incorporate interventions which address the specific correlates of burden deserves special attention. These strategies may be important in maintaining AD patients in the community as long as possible. Addressing the specific factors that are associated with caregivers' stress and psychological morbidity may have important social and humanitarian as well as economic implications

Psychiatric and behavioral symptoms occur in the majority of patients with Alzheimer's disease (AD) over the course of the illness (50–52), with symptoms of depression among 20–50%; of AD patients; agitated or aggressive behaviors appearing in 70%; and delusions or hallucinations in as many as 30–50% (53–57). In fact depression and psychosis are included as descriptors in the DSM-IV criteria for Alzheimer's disease (45). As such, the CATIE-AD sample, while selected to have these problems, is representative of the vast majority of AD patients.

The recent publication of specific clinical outcomes in CATIE-AD (58) supports earlier findings that behavioral symptoms of the kind we found to be most strongly associated with caregiver burden, may be improved by pharmacotherapy with atypical, or second generation antipsychotics (59–61). Our results suggest that at least for those patients who experience symptom relief with or without antipsychotic medications; such improvement may be associated with decrease in caregiver burden. Olanzapine and risperidone, in particular were found to have beneficial effects on the NPI total score, a summary measure of psychiatric and behavioral symptoms. Since the NPI was the strongest predictor of perceived burden among caregivers and changes in the NPI total score were most strongly associated with changes in burden measure, it can be hoped the effective treatment of symptoms as measured with the NPI will also reduce caregiver burden. These results form a foundation of further analysis of data from the CATIE trial that will explore this possibility.

There is also some evidence that some psychological interventions with care receivers can improve certain behavioral symptoms in dementia (62) and others. However, more evidence is required in this area (63). Interventions targeting caregivers, such as enhancing caregiver support, increasing 'time for self,' and providing caregivers with education and training in the management of behavioral and psychological symptoms of dementia have also been shown to be effective in decreasing burden and its impact on caregivers (64–66). Additional studies have shown that caregivers consider improvement in their relatives' quality of life to be just as important as efforts to prolong the patient's life when choosing treatment options and that improvement in quality of life is more important than either simply lengthening survival time or delaying a move to a nursing home (67). Alzheimer's disease related quality of life such as social interaction, maintaining interests, and participation in activities also emerged as a robust predictor of reduced caregiver burden in this study. However, since antipsychotic medications were not beneficial in improving patients' overall quality of life (Sutzer et al 2008), additional psychosocial interventions that aim at improving patients' quality of life directly through increased socialization and social interactions may prove valuable both for patients and caregivers.

Several methodological limitations require comment. First, although we used a longitudinal dataset, the findings remain associational in nature. In the absence of an experimental design, we cannot conclude that more severe symptoms and behavioral disturbances increase perceived caregivers' burden. However, the fact that both the cross sectional and the change-and-change analyses yield the same results adds to our confidence in these findings. Alternative explanations for these associations such as reverse causality and bi-directionality can not be ruled out since while symptom severity may increase caregiver burden and distress in the caregiver may also result in increased symptomatology in the patient with AD. Caregiver stress and maladaptive coping may predict behavioral problems in dementia patients (68).

A second limitation is that since some measures of patients' symptoms were based on the caregivers' reports, it is possible that caregivers' ratings of the severity of these symptoms reflect, at least in part, their own emotional state. However, the use of proxy reporting is inevitable in AD research and we tried to overcome this limitation by using multiple measures of both patients symptoms and caregivers distress.

Conclusion

Severity of psychiatric symptoms and behavioral disturbances and patients' quality of life have stronger association with caregiver perception of burden than cognitive functioning and functional skills. Combinations of pharmacological and behavioral and family interventions targeting these two aspects of the disorder are likely to not only alleviate patient suffering but also mediate improved caregiver well-being and may also delay nursing home placement thus reducing both direct and indirect costs of care.

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Table 1Characteristics of Study Sample at Baseline (n^{*}=413– 421)

	%	N	Mean (SD)	Range
Patient Sociodemographic Characteristics:				
Age			77.9 ± 7.5	51.0 – 103.0
Female	56%			
Race/Ethnicity	%			
White Race	79.0%			
Hispanic 0.05	5.2%			
Marital Status	%			
Married	59.1%			
Education			12.3 ± 3.4	0.0 – 21.0
Caregiver Sociodemographic Characteristics:				
Age			63.0 ± 15.5	22.0 – 89.0
Female Sex	70%			
Race/Ethnicity				
White Race	78.8%			
Hispanic	0.5%			
Other/missing				
Education		4 .1	2.0	1.0 – 10.0
Relationship with Patient				
Spouse	39.4%			
Child	25.7%			
Other	34.9%			
Psychiatric and Behavioral Symptoms				
Neuropsychiatric Inventory (NPI)			36.9 ± 18.1	3.0 – 104.0
Brief Psychiatric Rating Scale (BPRS)			27.8 ± 12.3	3.0 – 72.0
Cornell Scale for Depression in Dementia (CSDD)			9.9 ± 5.5	0.0 – 31.0
Cognitive Skills				
Mini Mental State Examination (MMSE)			15.0 ± 5.8	4.0 – 30.0
AD Assessment Scale – Cognitive Subscale (ADAS-Cog)			34.6 ± 13.3	6.0 – 70.0
Functional Abilities				
AD Cooperative Study – Activities of Daily Living Scale (ADCS-ADL)			39.0 ± 17.2	0.0 – 77.0
Quality of Life				
AD-Related Quality of Life			67.3 ± 14.7	– 100.00
Care Needs				
Dependence Scale			3.2 ± 0.9	0.0 – 5.0
Equivalent Institutional Care			1.9 ± 0.7	1.0 – 3.0
Caregivers Activity Scale			16.3 ± 11.9	0.0 – 75.0
Hospitalization for at least 2 weeks	1.2%			0.0 – 1.0
Caregivers Burden				
Burden Interview			34.4 ± 16.0	0.0 – 88.0

	%	N	Mean (SD)	Range
NPI Distress Score			16.5 ± 8.6	0.0 – 45.0
Beck Depression Inventory			8.1 ± 7.3	0.0 – 42.0

Table 2

Bivariate Correlation of Caregivers' Burden, patient and Caregivers' characteristics, Patients' Psychiatric and Behavioral Problems, Functional Abilities, Quality of Life, and Care Needs.

	Burden Interview	Beck Depression Inventory	Distress Scale
Patients Socio demographic Characteristics			
Age	-0.10	-0.04	-0.09
Female	-0.09	-0.11	-0.05
Race/Ethnicity			
White Race	0.06	0.09	0.08
Hispanic	0.02	0.10	0.12
Marital Status	0.11	0.10	0.05
Caregivers Sociodemographic Characteristics			
Age	0.04	-0.01	-0.05
Female Sex	0.06	0.01	0.06
Education	-0.06	-0.11	-0.19**
Relationship with Patient			
Child	0.08	-0.03	-0.04
Spouse	0.14*	0.14	0.07
Psychiatric and Behavioral Symptoms			
Neuropsychiatric Inventory (NPI)	0.38***	0.34***	0.74***
Brief Psychiatric Rating Scale (BPRS)	0.24***	0.18**	0.32***
Cornell Scale for Depression in Dementia (CSDD)	0.27***	0.26***	0.45***
Cognitive Skills			
Mini Mental State examination (MMSE)	-0.06	-0.05	-0.12
AD Assessment Scale – Cognitive Subscale (ADAS-Cog)	0.04	0.03	0.04
Functional Abilities			
Activities of Daily Living	-0.13*	-0.11	-0.19**
Quality of Life			
AD-Related Quality of Life	-0.36***	-0.30***	-0.44***
Care Needs			
Dependence Scale	0.08	0.04	0.09
Equivalent Institutional Care			
Caregiver Activity Scale	0.10	0.12	0.18**
Hospitalization for at least 2 weeks	-0.08	-0.05	-0.12
Burden Scales			
Burden Interview	--	0.58	0.52
Beck Depression Inventory	0.58	--	0.43
Distress Scale	0.52	0.43	--

* P < 0.01

** P < 0.001

 $P < 0.0001$

df(s) range from 421 to 271

Table 3
Stepwise regression of the relationship baseline burden measures and measures of patient status

	Burden Interview			Beck Depression Inventory			Distress Scale		
	Part R ²	F	df	Part R ²	F	df	Part R ²	F	df
NPI	0.15	68.4**	1,400	0.11	48.4**	1,398	--	--	1,397
The Cornell Scale for Depression in Dementia (CSDDD)	--	--	--	--	--	--	0.20	99.89**	--
AD-Related Quality of Life	0.03	16.1**	2,400	0.02	8.3*	2,398	0.07	37.24**	2,397

* $P < 0.01$

** $P < 0.001$

Table 4

Bivariate Correlation of Change in Caregivers' Burden, and Change in Patients' Psychiatric and Behavioral Problems, Functional Abilities, Quality of Life, and Care Needs.

	Change Burden Interview	Change Beck Depression Inventory	Change Distress Scale
Patients Socio demographic Characteristics			
Age	-0.02	0.02	-0.06
Female	-0.01	0.05	0.02
Race/Ethnicity			
White Race	0.05	-0.01	0.14
Hispanic	0.06	0.02	0.00
Marital Status	0.07	0.09	0.08
Relationship with Patient			
Child			
Spouse			
Psychiatric and Behavioral Symptoms			
Neuropsychiatric Inventory (NP)	0.43***	0.23***	0.78***
Brief Psychiatric Rating Scale (BPRS)	0.35***	0.20**	0.44***
Cornell Scale for Depression in Dementia (CSDD)	0.36***	0.18*	0.37***
Cognitive Skills			
Mini Mental State examination (MMSE)	0.00	-0.03	-0.16*
AD Assessment Scale – Cognitive Subscale (ADAS-Cog)	0.06	0.06	0.14
Functional Abilities			
Activities of Daily Living	0.01	0.01	-0.06
Quality of Life			
AD-Related Quality of Life	-0.35***	-0.20**	-0.39***
Care Needs			
Dependence Scale			
Equivalent Institutional Care			
Caregiver Activity Scale	0.19**	0.08	0.16*
Hospitalization for at least 2 weeks			
Burden Scales			
Burden Interview	1.00	0.40***	0.43***
Beck Depression Inventory	0.40***	1.00	0.26***
Distress Scale	0.43***	0.26***	1.00

* P < 0.01

** P < 0.001

*** P < 0.001

df(s) range from 421 to 271

Table 5

Bivariate Stepwise Correlation of Change in Caregivers' Burden, patient and Caregivers' characteristics and Change in Patients' Psychiatric and Behavioral Problems

	Change Burden Interview			Change Beck Depression Inventory			Change Distress Scale		
	Part R ²	F	df	Part R ²	F	df	Part R ²	F	df
Change NPI	0.19	67.2**	1,288	0.05	10.0***	1,284			
Change BPRS							0.20	57.4**	1,234
Change in the CSDD							0.04	11.4**	2,234
Change in MMSE							0.02	5.7**	3,234
Change in AD-Related Quality of Life	0.01	5.49	4,288	0.01	4.23	2,284			

Note. BPRS = Brief Psychiatric Rating Scale. CSDD = Cornell Scale for Depression in Dementia. MMSE = Mini Mental State Examination.

* P < 0.01

** P < 0.001