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Functional Ability of MCI and Alzheimer's Patients Predicts Caregiver Burden

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Abstract

Research has shown that caregivers of dementia patients display burden and psychological distress, but it is unclear whether or not caregivers of individuals with cognitive impairment who do not meet diagnosis for dementia also experience similar burdens and psychological problems.

Sixty patients and their caregivers participated in this study designed to examine caregiver burden. Patients completed activities of daily living tasks and several neuropsychological tests assessing memory, abstract reasoning, and language. Caregivers completed self-report measures assessing caregiver burden and psychological distress. Results revealed that the caregivers of patients with mild Alzheimer's disease (mAD) endorsed greater physical burden and feelings of missing out on life compared to individuals with mild cognitive impairment (MCI) caregivers. The mAD caregivers indicated greater depression and anxiety relative to MCI caregivers. Stepwise regression found that fewer patient neuropsychological scores predicted caregiver burden, as compared to patients' daily functioning. The conclusions of this study suggest that 1) caregivers of mAD are likely to experience more severe types of burden and psychological distress relative to caregivers of MCI patients, and that 2) patients' daily functional abilities better predicted caregivers' burden and psychological distress than patients' neuropsychological functioning. Study findings suggest that caregivers of those in the early stages of dementia, even in those who are not yet meeting diagnosis, experience psychological symptoms and burden and these caregivers' experiences can be predicted best by the patients daily functional ability as compared to patients' neuropsychological test scores.

Keywords: mild cognitive impairment, Alzheimer's disease, caregiver burden, cognitive ability, functioning ability

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Key Points: Predicting caregiver burden from Alzheimer's disease and MCI patients functional abilities; Daily functioning of Alzheimer's disease and MCI patients

MCI and mild Alzheimer's disease patients' cognitive and functional status predict caregiver burden

Introduction

Caregiver burden has been defined as the adverse effect on a caregiver's life, including emotional, social, financial and physical functioning as a result of caring for a patient (Zarit, Todd, & Zarit, 1986). According to a report by the National Alliance for Caregiving and AARP (2009), approximately 90% of long-term, in home care, is provided by unpaid caregivers, usually family members and friends.

There is a large body of research demonstrating that providing care for a patient with dementia results in burden and psychological distress for caregivers (Adelman, Tmanova, Delgado, Dion, & Lachs, 2014; Razani et al. 2007; Razani et al., 2014). Caregiver burden in some cases is associated with lack of social interactions and/or physical activity. Accordingly, research had demonstrated that symptoms of depression and anxiety are a common finding in caregivers of those with dementia (Adelman, Tmanova, Delgado, Dion, & Lachs, 2014; Garand, Dew, Eazor, DeKosky, & Reynolds, 2005). In addition, studies have found that caregivers of patients also experience significant levels of hostility (Cooper, Balamurali, Selwood, & Livingston, 2007; Razani et al., 2014; Wright et al., 2010).

In contrast to the abundance of research on the caregiving experiences of those with dementia, there is a dearth of information on caregivers of individuals with MCI. MCI is believed to be a transitory state between normal aging and dementia for many individuals (Teng, Becker, Woo, Cummings, & Lu, 2010). During this period of time some mild levels of cognitive decline will occur, such as memory loss, but most aspects of activities of daily living (ADLs) are believed not to be so severely disrupted as to interfere with functioning (Petersen, 2004). Thus, it

is unclear how much informal caregiving takes place for those with MCI by spouses and/or other next-of-kin. As such, little is known about the experiences of those who provide any level of caregiving or assistance to MCI individuals.

In one of a few studies assessing burden in caregivers of individuals with MCI, Paradise et al. (2015) found that these individuals experience twice the level of burden relative to caregivers on non-MCI individuals. In a different study, 30% of children or spouses of those with MCI reported significant levels of caregiver burden, with their burden rating relating to specific patient factors, including memory impairment and length of symptom presentation (Bruce et al., 2008). Another study investigating caregiving of individuals with MCI provided by their spouses, found lower levels caregiver burden and distress relative to those reported by caregivers of dementia patients in past research (Garand, Dew, Eazor, DeKosky, & Reynolds, 2005). Similarly, Fisher and colleagues (2011) found that caregivers of cognitively impaired patients spend far more hours caring for the patient relative to caregivers of medically ill, non-cognitively impaired individuals.

Even fewer studies have compared caregiver experiences of those with MCI to those caring for patient diagnosed with Alzheimer's disease. In the single study found, Ryan et al. (2012) assessed the neuropsychological performance of MCI, AD and normal controls as well as their respective caregivers on a host of caregiver burden, support and psychological factors. Among other findings, they reported that 1) MCI performed better than AD, but worse than controls on neuropsychological tests, 2) Caregivers of MCI caregivers reported significantly less caregiving burden relative to AD, but more than controls, 3) MCI and AD caregivers displayed similarities in some areas of emotional, physical and social burden, and 4) that patient neuropsychiatric and executive function scores were correlated with caregiver burden.

To better understand the findings of Ryan et al. (2012), we use both an observation-based functional ability test (which allows for assessment of specific domains of daily functions) as well as traditional neuropsychological tests with MCI and AD patients. The earlier in the disease stage that such predictions can be made about caregiver burden and psychological well-being from patient cognitive and functional abilities, the greater the chances are of implementing interventions to improve quality of life for both patient and caregiver.

While the psychological distress experienced by caregivers of Alzheimer's disease (AD) patients has been well characterized (Farias et al., 2009; Perneschky et al., 2006), the same is not true of MCI. A study by Lu et al. (2007) found the prevalence rate of depressed mood in caregivers of MCI individuals to be 24.6% in a sample of over 700 individuals. Similarly, Springate and Tremont (2013) found a negative relationship between caregiver depression and patients' IADLs. In this same study, patients' behavioral symptoms were also correlated with caregivers' level of depression, such that higher uninhibited behaviors in patients were associated with higher depression levels in their caregivers. While these studies have examined relationships between MCI behavioral issues and depression in their caregivers, they have not assessed the role of specific, observed ADL deficits, and their effect on caregiver burden and psychological distress. Additionally, given that MCI is a transitory state, likely to lead to AD when it progresses, it is important to understand the similarities and differences in caregiving experiences of those with MCI and mild AD (mAD). Studies of patients with mAD have demonstrated that increased levels of caregiver burden and psychological distress are associated with decreased functional abilities in patients with dementia (Kim, Chang, Rose, & Kim, 2012; Razani et al., 2007; Razani et al., 2014).

The purpose of the present study was multifold. First, we aimed to examine the differences in burden and psychological distress between MCI and mAD caregivers. We hypothesized that caregivers of MCI would report burden and psychological distress in some areas, but not all. Second, we were interested in examining how functional abilities, as assessed by an observation-based measure, in individuals with MCI and mAD account for the burden and psychological distress experienced by their caregivers. Given past reporting, we hypothesized that patient specific domains of functioning in patients would predict circumscribed aspects of caregiver burden and psychological stress. Finally, we were interested in how well patient neuropsychological functioning would predict aspects of caregiver experiences (burden) and psychological well-being. Based on previous findings (Ryan et al, 2012), we hypothesized that very few patient neuropsychological test scores would predict caregiver scores, but the few that did would be those assessing executive functioning.

Method

Participants

Sixty older adults and their caregivers participated in this study (50 spouses, 2 child, 6 other kin and 2 not related). Specifically, 40 participants were caregivers to patients diagnosed with mAD and 20 were caregivers to patients with MCI.

Patients in the MCI group were recruited from the University of California, Los Angeles (UCLA) Alzheimer's Disease Research Center (ADRC). The majority of the UCLA ADC participants were referred to the study by UCLA and outside neurologists, however, referrals also came from the community clinics, community outreach conducted by the center, and interested individuals contacting the center through the ADRC website. To be included in the ADRC cohort subjects had to be 50 years or older and carry a diagnosis of cognitively normal,

MCI or dementia. Diagnosis for each subject was based on a consensus by all UCLA Alzheimer's Disease Research Center (ADRC) neurologists, the ADRC neuropsychologists, psychometrists and other key study personnel. MCI diagnosis was based on Petersen (2004) criteria and required objective cognitive decline at 1.5 SD or below age- and education-adjusted neuropsychological norms, global clinical dementia rating (CDR) score <1 , preserved general cognitive function and intact activities of daily living.

The mAD patients were recruited from a regional Los Angeles Alzheimer's Association Center, a geriatric center, and a Veterans Administration (VA) healthcare center. The research team was invited to the monthly caregiver/patient group meetings of the regional Los Angeles Alzheimer's Association to provide information/updates of the research projects and to recruit participants. At these meetings, the study goals and requirements were described and volunteer patient/caregivers dyads who were interested volunteered to participate. Recruitment at the VA healthcare center and the geriatric center took place at the memory disorders clinics. Patients identified by healthcare professionals as meeting criteria for the study referred patients to the research team to learn more information and volunteer for participation in the study.

All participants, regardless of the recruitment site, were diagnosed with AD by their primary physician and/or neurologist using the National Institute of Neurological and Communicative Diseases and Stroke-Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA; McKhann et al., 1984) criteria for probable AD, prior to being referred to the study (Razani et al., 2007).

Measures

The following assessments were included in a larger battery of neuropsychological tests. Patients were administered tests assessing cognitive and functional ability. Caregivers were

asked to complete a shorter battery of self-reports assessing caregiver burden and psychological distress.

Patient Neuropsychological Measures

Phonemic [FAS] and Category (Animals) Fluency; Benton & Hamsher, 1989). This test evaluates the spontaneous production of words. For the phonemic fluency test, participants are required to produce words that begin with the letters F, A, and S in 60 seconds. Likewise, for the category fluency portion, participants were asked to produce as many animals as they could in 60 seconds. For each test, an outcome score of the number of original words produced in the allotted time.

Rey-Osterrieth a Complex Figure Test (Rey-O; Meyers & Meyers, 1995). This is a test of visuo-construction and visual memory. Participants are required to copy a geometric design and then draw the same design from memory 3 minutes later.

California Verbal Learning Test-second edition Short Form (CVLT-II; Delis, Kramer, Kaplan, & Ober, 2000). The CVLT-II SF is a comprehensive and detailed assessment of episodic verbal learning and memory in which participants learn 9 words over 4 trials and then recall items after a 10-minute delay. For the purpose of this study, percentage of savings score was calculated and used as the outcome score for this test for each participant using the following formula: $[\text{words recalled after delay} / \text{words recalled on the last learning trial}] * 100$.

Wisconsin Card Sorting Test, 64-item version (WCST-64; Kongs, Thompson, Iverson & Heaton, 2000). This test is used to assess executive functioning such as abstract reasoning (Berg, 1948). Participants are required to sort 64 cards to stimulus cards based on three principles: color, form, and shape. The outcome measures of total categories correctly sorted, total errors committed and overall percent conceptual understanding was used.

Patients Activities of Daily Living Measure

Direct Assessment of Functional Status (DAFS; Loewenstein et al., 1989). The DAFS is a direct observation assessment of activities of daily living assessing the following seven functional domains: (1) Time Orientation (total of 16 points): a) ability to *tell time* presented on a clock (0-8 points) and b) *Orientation* to person, place, and date (0-8 points); (2) Communication Skills (total of 14 points): a) ability to use a *telephone* when presented with names and phone numbers and instructed to dial specific individuals (0-8 points), and b) prepare a letter to mail by writing the correct location of addresses, place a stamp, and seal the envelope (0-6 points); (3) Transportation Skills (13 total points): a) ability to *identify road signs* requires that they describe the use of specific signs presented (0-10 points), and b) knowing *driving rules* requires defining specific rules (0-3 points); (4) Financial Skills (19 points): a) ability to *identify currency* in coins and bills (0-7 points), b) *count currency* in specified amounts (0-4 points), c) *write a check* by placing the numeric and written amounts, date and signature on a check (0-4 points), and *balance a checkbook* on a ledger when instructed of specified purchase amounts (0-4 points); (5) Shopping Skills (17 points): a) ability to *freely recall* a list of six grocery shopping items that were verbally presented 10 minutes prior (0-6 points), b) “shop” by *recognizing* shopping items at a mock grocery store (0-6 points), c) “shop” for items *with a list* (0-4 points), d) *make correct change* when purchasing the mock grocery items (0-1 point). The last two subscales were not included as most participants were able to complete all the tasks and received perfect scores.

The reported inter-rater reliability coefficient for the DAFS have been in the mid 0.90 range and test-retest reliabilities for individual subscales have been relatively high, with cohens ranging from 0.57 to 0.92 (Loewenstein et al., 1989).

Caregiver Measures

Caregiver Burden Inventory (CBI; Novak, & Guest, 1989). The CBI is a 24-item multi-dimensional self-report questionnaire assessing caregiver burden. Each item on the CBI is rated on a 5-point Likert scale ranging from 0 (not at all descriptive) to 4 (very descriptive), with higher scores indicating greater feelings of burden. The following five subscales were used as outcome scores: 1) *Time Dependence*: assesses perceived burden due to restrictions on a caregiver's time imposed by the demands of caring for the care receiver; 2) *Developmental Burden*: assesses perceived feelings by the caregiver feelings of missing out on life; 3) *Physical Burden*: assesses fatigue and physical health associated with caring for the care receiver; 4) *Social Burden*: assesses conflicts with other family members about care decision, or feelings of isolation such as not having time to maintain social relationships; 5) *Emotional Burden*: assesses negative feelings toward their care receivers.

Brief Symptom Inventory (BSI; Derogatis, & Spencer, 1987). The Brief Symptom Inventory (BSI) is a 53-item, multidimensional measure of psychiatric symptomatology that has been shown to assess caregiver distress in previous studies. Participants are asked to rate how much in the previous week specific symptoms distressed them on a scale from not at all (0) to extremely (4). The following 3 subscale outcome scores were used: *depression*, *anxiety*, and *hostility*.

Procedures

Patients were administered the DAFS and the neuropsychology test battery, and their caregivers completed the CGI, CBI, and BSI. All assessments were administered by trained research assistants following standardized administration either in the participants' homes or on the

California State University, Northridge (CSUN) campus. This study had institutional review board approval from CSUN. All patients consented to voluntary participation.

Data Analyses

In order to assess the differences between the experienced burden and psychological distress of caregivers' of mAD and MCI, one-way ANOVAs were used. Stepwise regression analyses were performed for the combined mAD and the MCI groups in order to assess which neuropsychological tests and DAFS subscales best predicted specific caregiver burdens and psychological distress.

Results

Demographic, functional and neuropsychological performance for patients is shown in Table 1. Demographic information, caregiver burden, and psychological burden for caregivers are shown in Table 2. The MCI and mAD groups were well matched in terms of education and age, but differed in sex both groups included more males than females. The majority of patients regardless of diagnosis were Caucasian, 90%. Table 2 also shows the average burden and psychological distress experienced by caregivers. Caregivers reported moderate levels of burden on the Caregiver Burden Inventory (CBI) and low levels of psychological distress on the Brief Symptom Inventory (BS depression, anxiety and hostility subscales).

Group Comparisons

The differences between the specific types of burden and psychological distress experienced by mAD and MCI caregivers are presented in Table 2. Caregivers of mAD patients report higher levels of CBI Developmental Burden relative to those caring for MCI patients, $F(1, 64) = 4.03, p < .05$. The two groups of caregivers demonstrated no differences in any other areas of caregiving.

Caregivers of patients with mAD endorsed higher levels of depression on the BSI Depression subscale, $F(1, 64) = 5.27, p < .05$, and the BDI, $F(1, 64) = 4.56, p < .05$. Additionally, the caregivers of the mAD endorsed higher levels of Anxiety on the BSI, $F(1, 64) = 6.15, p < .05$. However, both caregiver groups endorsed the same degree of hostility (BSI Hostility subscale; see Table 1).

Demographic, neuropsychological and DAFS scores for patients are presented in Table 2. While patients did not differ on key demographic variables, such as age and education level, they did differ on memory and language variables. Additionally, they differed on all of the DAFS subscale, with the MCI outperforming the mAD.

Regression Analyses

Stepwise multiple regression results assessing the best DAFS subscale predictors of caregiver burden and psychological distress subscales in the pooled sample are presented in Table 3. These findings revealed that the patients combined scores of Communications and Shopping subscales of the DAFS accounted for 38% of the caregivers Time Dependence subscale scores of the CBI. Additionally, the Communications subscales of the DAFS alone accounted for significant proportion of variability in Physical and Emotional caregiver burden (19% and 11%, respectively). Finally, the Transportation subscale of the DAFS accounted for 21% of the variability in the Developmental burden subscale of the CBI, while the Orientation subscale of the DAFS accounted for 27% of Social burden caregiver scores.

Table 4 shows the ability of patients' cognitive performance to predict their and caregiver's level of burden and psychological distress. The findings reveal that only a few patient neuropsychological scores predict caregiver burden and psychological distress. Essentially, the WCST accounted for significant proportion of the variability in Time Dependence and Physical

burden in caregivers (24% and 23%, respectively). Also, the Rey-O delay recall scores of patients accounts for depression scores (18% of BSI caregiver depression scores and 17% of BDI caregiver scores).

Discussion

Much interest has been paid to MCI in the past decade, as it is often found to be the precursor to diagnosable dementia (Petersen, 2004; Morris et al., 2001; Windbald et al., 2004). The progression for MCI to dementia (often AD) results in an increased decline of daily functional and cognitive abilities in patients (Avila et al., 2015; Bangen et al., 2010; Teng et al., 2010), but how these impairments affect caregiver burden and psychological distress remain unclear. The purpose of the current study was to investigate the association between MCI and mild AD patients' functional abilities and cognitive abilities, and the degree to which these factors predict burden and psychological distress experienced by their caregivers. Our findings indicate that significant differences in the experiences of caregivers of MCI and mAD are evident.

First, we found that mAD caregivers report greater feelings of missing out on life/activities (developmental burden) as a result of caring for the patient as compared to MCI caregivers. Similarly, mAD caregivers report greater physical burden relative to MCI caregivers. However, no differences between the two groups of caregivers were found in burden as it relates to restriction of time (time dependence), conflicts with family members such as care decisions (social burden) or feelings of isolation (social dependence, or negative emotions toward the patient (emotional burden) in caregivers of mAD or MCI. Our findings are similar to that of Ryan et al (2012) given that they also found their AD caregivers to report greater developmental burden compared to MCI caregivers. However, whereas in the Ryan et al. study they also found AD caregivers to report more time dependence burden, we found our sample to report greater

physical burden, relative to MCI caregivers. Taken together, our findings suggest that as MCI patients progress to full diagnosis of AD, caregivers may be likely to find the greatest increase in burden in the areas of restriction in their life activities and physical care of the patient. Other studies supporting this conclusion have found that progression of dementing disease is a significant factor in determining caregiver burden (Razani et al., 2014) and that functional decline and dependence on care are most predictive of caregiver burden in patients (Schulz, O'Brien, Bookwala & Fleissner, 1995).

Second, high levels of depression (Lu et al., 2007) and anxiety among caregivers has been reported in the literature (Schulz et al., 1995), with a comprehensive review study finding that those caring for MCI individuals display depressed symptoms, albeit, not as severe as those caring for more advanced dementia (Seeher, Lova, Reppermundc, & Brodaty, 2013). The current study expands this area of research by demonstrating that caregivers of MCI patients report less depression and anxiety than those of patients diagnosed with mild AD. These results are also consistent with the previous literature highlighting that 30%-36% of caregivers of MCI patients have clinically significant levels of depression (Bruce et al., 2008; Paradise et al., 2015) and add to that literature by showing worsening of symptoms for caregivers of mild AD relative to those of MCI patients. Interestingly, the current study did not find any differences in the level of hostility between the two caregiver groups. While there are qualitative studies showing that negative emotion such as frustration and anger are common in caregivers of MCI (Blieszner, Roberto, Wilcox, Barham, & Winston, 2007; Lu & Haase, 2009), there is no quantitative reporting of hostility in MCI caregivers. We (Razani et al., 2007; Razani et al., 2014) and others (Wright et al., 2010) have reported significant levels of hostility in caregivers of AD patients and in most cases, the hostility is related to functional decline in the patient. Our current findings

seem to suggest that caregivers of MCI and mild AD are experiencing the same levels of hostility. Perhaps differences in the levels of hostility would emerge if MCI caregivers are compared to those of AD patients in more severe stages of dementia.

In terms of patient functional abilities that best predict caregiver burden, it appears that communication skills are one of the best predictors. The worse the patients' communication skills, the greater caregiver burden is in terms of time restrictions, physical assistance and emotional connection with others. Similarly, transportation skills in patients is a predictor of caregiver feelings of missing out on life experiences, while functional skills that rely on long- and short-term memory tasks, specifically shopping and orientation tasks in patients were best predictors of feeling out of sync with peers and social interactions in caregivers.

It is important to note that patients' deficits in financial skills best predicted depression, while communication skills predicted hostility in caregivers. This may partially be explained by the continuous need for caregivers to communicate for the patient in many situations, contributing to the caregiver feeling like their life revolves around the patient, and consequently, resulting in feeling irritated, annoyed and arguments (Derogatis & Spencer, 1987). Our findings are in line with past studies which have demonstrated that caring for MCI and dementia participants can increase household responsibilities, which show a clear relationship to subjective caregiver burden and psychological distress (Garand et al., 2005; Razani et al., 2007, Razani et al., 2014; Wright et al., 2010).

Finally, consistent with the findings of Springate and Tremont (2011), the patients' neuropsychological test scores were not strong (and in most cases, not statistically significant) predictors of caregiver burden or psychological distress. Of the neuropsychological domains, patients' impaired executive functioning was the best predictor of burden and psychological

distress in their caregivers. Ryan et al. (2012) found similar relationships between MCI executive functioning and caregiver distress and concluded that executive dysfunction in MCI may be an early indicator regarding the needed caregiver resources. In the case of our findings, it indicates that as patients become less capable of planning and organizing tasks on their own, caregivers are likely to become more burdened by time needed to care for their loved one and need to provide more physical assistance. Additionally, language fluency, as measured by the category test (naming animals) was the best predictor of hostility and verbal memory predicted depression in caregivers. However, taken together, these results suggest that while specific aspects of neurocognitive compromise in patients predict caregiver burden and psychological distress, the majority of neuropsychological tests scores are poorer predictors relative to actual patient daily functional abilities.

There may be a few reasons for why neuropsychological performance in these patients did not predict caregiver experiences as well as patient daily functional abilities. Since the DAFS assesses *actual abilities* for performing routine, daily tasks in these very mildly impaired patients, it is likely to directly tap into the experiences and frustrations that caregivers experience in assisting patients with these tasks. On the other hand, neuropsychological tests capture more abstract, underlying processes of the dysfunction and so may not directly relate to caregiver experiences. Additionally, at this mild stages of illness, the MCI and AD patients may not display a great range of impairment on the various cognitive domains and as such it is difficult to capture those skills that lead to frustration for their caregivers. As such, it appears that, at least during these mild stages of cognitive impairment, actual functional ability of patients better predicts specific burden/distress a caregiver are likely to experience.

There are, of course, some limitations to the current study which warrant discussion as it relates to the conclusions and generalizability of these findings. As noted in the methods sections, all participants regardless of the recruitment site were diagnosed using the NINCDS-ADRDA (McKhann et al., 1984) criteria for probable. However, it is unclear to what degree the level of given disease information to patient and caregiver at diagnosis might have differed between the several recruitment settings and in turn impacted perceived caregiver burden. Future studies should include information provided to caregivers and patients across recruitment sites as a factor in predicting caregiver burden and psychological distress for the sake of generalizability. Similarly, we recognize that additional factors such as socio-economic factors, living conditions and specific knowledge/information about cognitive impairment of patient impairment by caregivers may be significant factors to examine in order to better understand predictors affecting caregiver burden. The current study's focus was on better understanding the impact of patient functioning on caregiver burden and psychological distress. Future studies should broaden the caregiver variables that might also be predictors of caregiver burden. Additionally, the current study had a relatively small sample size, particularly of MCI patients and caregivers, and the majority of our patients were males and as such the majority of caregivers were female. The burdens experienced by the different genders may vary and as such should be examined more closely in future studies.

Implications

An important finding from this study indicates the need for caregivers to have more support and resources in their caring for a patient (Cooper, Balamurali, Selwood, & Livingston, 2007). Specifically, it is important to provide them with treatment for depression and overall psychological distress. There needs to be an outlet for caregivers to express their feelings and

burden they are experiencing. This treatment is necessary as a healthier, physically and psychologically, caregiver will then be able to provide a higher quality of care for a patient.

Findings from this study can be used by practitioners working with MCI and early stage AD patients and their caregivers to provide psychoeducation to caregivers about what types of cognitive and functional impairments that are common in patients with MCI and mAD and how these may possibly worsen over time. Information can be provided as to the burden and psychological distress (particularly feelings of hostility) that is common among caregivers. This information will help the caregivers be more aware of their psychological state and seek specific treatments if necessary, as research has found that more psychological distress increases caregiver burden (Schulz et al., 2002). Lastly, information can also be provided to caregivers on finding resources, support groups and/or treatment for any current or future psychological distress.

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Table 1.

Comparison of mAD and MCI patient demographic, neuropsychological and functional ability scores

Variables	mAD	MCI	F value	p value
<i>Demographics</i>				
Age	75.57 (\pm 9.79)	73.96 (\pm 9.36)	.43	.52
Education	15.00 (\pm 4.23)	16.68 (\pm 9.73)	.60	.45
Gender (M/F)	29/11	13/7		
<i>Neuropsychological Test Scores</i>				
Mini Mental State Exam	21.80 (\pm 5.33)	26.10 (\pm 4.44)	10.31	<.01
Phonemic Fluency (FAS)	24.20 (\pm 12.02)	31.95 (\pm 16.21)	4.79	.32
Category Fluency (Animals)	8.76 (\pm 4.84)	19.00 (\pm 14.03)	20.75	<.01
CVLT % Savings	75.25 (\pm 37.62)	45.34 (\pm 53.10)	5.55	.02
Rey-O % Savings	82.95 (\pm 21.20)	63.22 (\pm 22.91)	10.83	<.01
WCST Categories Completed	1.36 (\pm 1.19)	1.89 (\pm 1.49)	1.89	.18
WCST Total Errors	26.84 (\pm 10.35)	24.33 (\pm 10.83)	.66	.42
WCST % Conceptual	24.38 (\pm 12.57)	29.00 (\pm 17.85)	1.15	.29
<i>Direct Assessment of Functional Status</i>				
Total Score	68.22 (\pm 15.51)	78.90 (\pm 9.89)	8.48	.01
Orientation	11.42 (\pm 4.70)	15.05 (\pm 1.36)	11.93	<.01
Communication	10.90 (\pm 3.28)	12.43 (\pm 2.34)	3.75	.06
Transportation	11.12 (\pm 2.55)	12.33 (\pm 1.93)	3.81	.06
Financial	14.66 (\pm 3.92)	17.00 (\pm 2.47)	6.40	.01
Shopping	6.80 (\pm 3.16)	8.86 (\pm 3.64)	5.74	.02

Note: CVLT = California Verbal Learning Test; WCST = Wisconsin Card Sorting Test

Table 2

Comparison of mAD and MCI caregiver burden and psychological distress

Variables	Caregivers of		F value	p value
	mAD	MCI		
Age	69.00 (\pm 14.58)	70.21 (\pm 15.47)	0.22	.66
Education	14.58 (\pm 2.70)	15.47 (\pm 2.87)	1.40	.24
Gender (M/F)	13/27	5/15		
<i>Caregiver Burden Inventory Subscale</i>				
Time Dependence Burden	6.98 (\pm 5.29)	5.06 (\pm 5.34)	1.62	.21
Developmental Burden	6.83 (\pm 5.78)	3.83 (\pm 3.84)	4.00	.05
Physical Burden	3.23 (\pm 4.18)	1.44 (\pm 1.76)	3.01	.09
Social Burden	2.45 (\pm 4.22)	.89 (\pm 1.49)	2.31	.13
Emotional Burden	2.18 (\pm 3.33)	1.39 (\pm 2.12)	0.85	.36
<i>Brief Symptom Inventory Subscale</i>				
Depression	2.62 (\pm 2.56)	1.11 (\pm 1.57)	5.27	.03
Anxiety	2.90 (\pm 2.90)	1.11 (\pm 1.37)	6.15	.02
Hostility	2.10 (\pm 2.59)	1.89 (\pm 2.49)	0.09	.77
<i>Beck Depression Inventory</i>	9.67 (\pm 7.26)	5.63 (\pm 6.96)	4.56	.04

Table 3

Stepwise regression using DAFS subscales to predict caregiver burden and psychological distress

Caregiver subscale measure	DAFS Variable Entered	R ² Change	β	F value
<i>Caregiver Burden Inventory Subscale</i>				
Time Dependence Burden	Communication	.30	-.40	21.90**
	Shopping	.08	-.32	6.70**
Developmental Burden	Transportation	.21	-.43	14.16**
Physical Burden	Communication	.19	-.43	11.86**
Social Burden	Orientation	.27	-.52	19.14**
Emotional Burden	Communication	.11	-.34	6.57**
<i>Brief Symptom Inventory Subscale</i>				
Depression	--	--	--	--
Anxiety	Financial	.09		4.95*
Hostility	Communications	.08		4.25*
<i>Beck Depression Inventory</i>	Financial	.10		5.65*

Note: *p < .05; **p < .01

Table 4

Stepwise regression using neuropsychological measures to predict caregiver burden and psychological distress

Caregiver subscale measure	Neuropsychological Variable Entered	R ² Change	β	F value
<i>Caregiver Burden Inventory Subscale</i>				
Time Dependence Burden	WCST-Concept	.24	-.49	8.79**
Developmental Burden	--	--	--	--
Physical Burden	WCST--Cat Completed	.23	-.46	7.28*
Social Burden	--	--	--	--
Emotional Burden	--	--	--	--
<i>Brief Symptom Inventory Subscale</i>				
Depression	Rey-O 3 min	.18	-.42	5.61*
Anxiety	--	--	--	--
Hostility	Animals	.19	.44	6.07*
<i>Beck Depression Inventory</i>	Rey-O 3 min	.17	-.41	5.56*

Note: *p < .05; **p < .01