Short Communication

What Biological Factors, Social Determinants, and Psychological and Behavioral Symptoms of Patients with Mild Alzheimer's Disease Correlate with Caregiver Estimations of Financial Capacity? Bringing Biases Against Older Women Into Focus

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Abstract. This study examines the connection between biological factors, social determinants, and behavioral and psychological symptoms of dementia (BPSD) and the estimations of financial capacity made by caregivers of mild AD patients in Greece. Financial capacity estimations negatively correlated with biological sex of the patients (female), but Neuropsychiatric Inventory (NPI) scores were statistically lower for older females. BPSD (measured with NPI) was found to negatively correlate with estimates of financial capacity. The existence of delusions-hallucinations was reported in all males. No correlations were found between financial capacity estimations, actual cognitive and financial capacity performance, and all other included biological and social characteristics of the patients as well as their caregivers.

Keywords: Behavioral and psychological symptoms of dementia, biological factors, caregivers, financial capacity estimations, social determinants

INTRODUCTION

Neurocognitive disorders such as Alzheimer's disease (AD) are often diagnosed in later stages due to its insidious onset, and particularly in Greece, this can be explained by the fact that the general public is not able to recognize the early symptoms of this disorder, attributes the symptoms as part of the normal aging process, and shows general ignorance regarding this disease [1]. Although loss of financial capacity is a common consequence of AD [2], Parkinson's disease [3], vascular dementia [4], frontotemporal dementia [5], and amnestic mild cognitive impairment [6], only one study has investigated

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what caregivers of frontotemporal dementia patients believe [5]. This study found that caregivers tend to overestimate the patients' financial performance [5]. Although the general public opinion (as expressed in the attitudes of laypeople in Greece) shows doubts about financial capacity, mental capacity, and legal issues in older patients [7], so far, no research worldwide has focused on the possible predictors of the financial capacity estimations made by caregivers (adult children) for older AD patients.

In the Greek society, familism values and behaviors are widespread, something that is reflected in the fact that adult children are those who mainly take care of the older adults diagnosed with neurocognitive disorders and usually (and informally) they are the ones who take financial decisions for them, even if no official power of attorney document exists [2, 5, 7]. Thus, the perceptions-estimates of adult child caregiver regarding financial capacity in patients with AD not only counts but is also of paramount importance in understanding the decisions that are being made, but also in cases of detecting financial abuse.

This study included biological factors (such as the biological sex, age, and health status-existence of chronic disease(s) of mild AD patients and their caregivers) and social determinants (such as social engagement (social exclusion/isolation or support), rural/urban physical living environments, education and socio-economic status (based on income) of mild AD patients and their caregivers), as well as the behavioral and psychological symptoms of dementia (BPSD) as presented in mild AD patients. Here, we must note that ethnicity/race, religion, and access to health services were excluded as variables as all participants and their caregivers were Greeks, Greek Orthodox Christians, and with a state insurance that ensured access to healthcare services. In addition to that, socioeconomic status (SES) and vulnerability was not simply defined as annual income above/below the yearly Greek poverty threshold, but for this sample the following categories were presented to choose from (severe hardship, significant hardship, some hardship, fairly comfortable, comfortable, good, and very good). Patients and caregivers SES coincided, so only one variable was used in the statistical analyses.

METHODS

The participants of this study were recruited in the Memory Clinic of a local Greek Hospital and elderly day care centers of the Greek Alzheimer Association. 109 Greek older adults (61 women and 48 men ≥65 years old, all having financial experience in their prior lives as confirmed by history taking) with a diagnosis of mild AD, coming from both rural and urban areas in Northern Greece, underwent a neuropsychological evaluation with an extensive battery of neuropsychological tests administered according to the routine protocol assessing all major cognitive domains (memory, language, attention and information processing speed, visual–spatial ability, and executive functions). After the completion of the assessment, 109 caregivers ($n = 68$ female daughters, $n = 41$ sons) caring for these home-dwelling mild AD patients completed a detailed demographics questionnaire and were asked a single question 'Please indicate your estimations on this 5-point Likert scale regarding your mother's/father's financial capacity'. The caregivers did not have any knowledge of the neuropsychological test results. Caregivers had to be family members (preferably son or daughter as adult children were the target group as healthy husbands/wives were not accompanying the older patients and for the majority of this sample were not alive), 18 years or older, and able to give informed consent. In addition to that, they all had financial experience and knowledge that is real-life practice acquired on managing and making use of money. None had attended specialized education programs on financial capacity assessment issues. Procedures were approved by the local university Bioethics Committee Greece (2/27.3.2013) following the declaration of Helsinki. The patients/participants provided their written informed consent to participate in this study.

Financial capacity was directly assessed with the use of the Legal Capacity for Property Law Transactions Assessment Scale (LCPLTAS) [2], which consists of seven main domains: 1) basic monetary skills, 2) cash transactions, 3) bank statement management, 4) bill payment, 5) financial conceptual knowledge, 6) financial decision making, and 7) knowledge of personal assets [2].

BPSD were measured with the use of the Neuropsychiatric Inventory (NPI), which is a questionnaire given to the caregiver, exploring 12 behavioral and neuropsychiatric domains (such as delusions, hallucinations, agitation/aggression, disphoria/depression, anxiety, apathy, irritability, euphoria, disinhibition, aberrant motor behavior, sleep behavior disturbances, besides appetite and eating abnormalities). It evaluates the frequency and severity

of the symptoms and the impact of each behavior on the caregiver [8]. The domain total score is obtained by multiplying the severity of symptoms (1 = mild; 2 = moderate; 3 = severe) with their frequencies (4-point scale from 1 = occasionally to 4 = very frequently, more than once a day). A total score of NPI is obtained by summing all the domain total scores.

General cognition was measured with the use of Mini-Mental State Examination (MMSE), which examines a plethora of cognitive domains such as memory, language, orientation, attention, and visual-spatial skills [9]. Depression was also measured with the use of the Geriatric Depression Scale (GDS), which is widely used in the Greek older population [10].

Data analysis

IBM SPSS Statistics for Windows (version 22, IBM Corp., Armonk, New York) was used for data analysis. Descriptive statistics were computed to describe the abovementioned variables using means (M) and standard deviations (SD) for dispersion for continuous type variables. Frequency counts were computed for categorical variables. Correlation matrices were extracted by using Pearson correlation coefficients. Dummy variables were created for the categorical variable sex. A p value < 0.05 was considered statistically significant.

RESULTS

Descriptive statistics were computed for this sample of participants using means (M) and standard deviations (SDs) for all variables (see Table 1). Pearson correlations were performed between biological factors, such as the biological sex, age, and health status-existence of chronic disease(s) of mild AD patients and their caregivers; social determinants, such as social engagement (social exclusion or isolation to complete social support) as measured by a 5-point Likert scale, education (in years), and socio-economic status (based on income) of mild AD patients and their caregivers; and BPSD, as presented in mild AD patients with the use of the NPI.

Statistically significant correlations were found between financial estimations and the sex of the patients. More specifically a negative correlation was found ($r = -0.247$, $p = 0.010$). In addition to that, a

Table 1
Means and standard deviations (SD) of measured variables based on the patients' sex

Variables	Sex	Mean	SD
GDS (patient)	Male	1.21	1.47
	Female	1.40	1.59
Age (y; patient)	Male	73.81	4.64
	Female	74.14	5.63
MMSE	Male	22,37	3.62
	Female	22.03	3.75
Education (y; patient)	Male	10.14	3.80
	Female	9.75	3.22
LCPLTAS (patient)	Male	141.56	73.72
	Female	149.03	74.02
Financial capacity estimations (made by caregivers)	Male	2.91	1.02
	Female	2.44	0.84
Age (y; caregiver)	Male	42.52	5.50
	Female	41.26	5.59
SES (coinciding for caregiver and patient who live together)	Male	3.27	0.79
	Female	3.49	0.67
Health status (patient)	Male	1.54	0.50
	Female	1.60	0.49
Health status (caregiver)	Male	1.25	0.43
	Female	1.32	0.47
Social engagement (patient)	Male	2.08	0.91
	Female	1.95	0.79
NPI (patient)	Male	9.41	10.87
	Female	5.45	5.46

negative correlation was found between financial estimations and NPI total score ($r = -0.458$, $p < 0.001$) (Table 2).

In search of any possible differences between males and females, there were no differences between the group of older men and women AD patients regarding their education (t(107) = 0.581, $p = 0.563$), MMSE scores (t(98) = 0.451, $p = 0.653$), GDS (t(99) = 0.593, $p = 0.554$), their age (t(107) = 0.333, $p = 0.740$), health status (t(107) = 0.676, $p = 0.500$), social engagement (t(104) = 0.826, $p = 0.411$), actual financial capacity performance as measured by LCPLTAS (t(107) = 0.524, $p = 0.601$), the age of their caregivers (t(107) = 1.174, $p = 0.243$), the health status of their caregivers (t(107) = 0.881, $p = 0.380$), SES (t(105) = 1.552, $p = 0.124$), and sex ratio of their caregivers (χ^2 (1) = 0.439, $p = 0.551$) that could explain the difference found in the expressed estimations of the caregivers regarding patients' financial capacity (when grouping was based on the patient's sex) (t(107) = 2.639, $p = 0.010$). There was only one statistically significant difference with men showing higher scores in NPI (t(85) = 2.201, $p = 0.030$; Mfemale = 5.45, SD = 5.46, Mmale = 9.41, SD = 10.87). One additional interesting qualitative finding is that delusions and hallucinations were reported for all the cases of men with BPSD as measured by NPI.

Table 2
Correlations for study variables

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Financial estimations	–	–0.247*	0.121	–0.116	–0.080	0.001	–0.458**	–0.042	–0.043	–0.059	0.097	–0.066	0.026	–0.145
2. Sex[a]		–	0.022	–0.056	–0.045	0.060	–0.232*	0.051	–0.081	0.065	–0.113	0.074	0.150	0.085
3. Age (patient)			–	–0.090	–0.050	–0.084	–0.048	–0.052	0.133	0.007	–0.066	–0.150	–0.059	–0.141
4. Education (patient)				–	0.321**	–0.030	–0.042	0.421**	0.074	–0.040	0.076	0.033	–0.176	0.008
5. MMSE					–	0.067	0.015	0.487**	–0.091	–0.082	0.149	–0.033	0.029	0.015
6. GDS						–	–0.014	0.014	–0.122	–0.223*	0.044	–0.160	0.131	–0.018
7. NPI							–	–0.077	0.031	0.033	–0.002	0.091	–0.114	–0.077
8. LCPLTAS								–	–0.110	–0.164	0.096	–0.098	0.105	0.052
9. Social engagement									–	0.123	–0.058	0.101	–0.012	–0.032
10. Health status (patient)										–	–0.119	0.027	–0.112	0.061
11. Age (caregiver)											–	0.094	0.030	0.076
12. Sex (caregiver)												–	–0.098	0.085
13. SES (caregiver)													–	–0.016
14. Health status (caregiver)														–

*$p < 0.05$, and **$p < 0.001$. [a]Dummy coded variable; 0 = male, 1 = female.

DISCUSSION

This is the first study of its kind for the Greek geriatric population to show the importance of older patients' characteristics on the financial capacity estimations made by their caregivers. Caregivers seem to be biased towards older women, reporting lower estimations for them, although women are not different from men in their cognitive performance as measured by MMSE, depressive symptomatology as measured by GDS, and actual financial capacity as measured by LCPLTAS. Additionally, an interesting finding is that women did not demonstrate the same high levels of BPSD as did men, something that supports that the discovered sex-related financial capacity preconceptions are actually prejudices against women.

There are many reasons which could interpret why caregivers offered lower financial capacity estimations for female AD patients. For example, two explanations could be based on lifetime financial roles and the structure of the Greek society, but it seems that this not the case as after the second World War, both men and women had to be involved in financial matters, both in rural and urban areas.

Although a plethora of factors were included, one major limitation of this study is that it does not cover all possible factors. This exploratory study aims to establish what factors should be considered in future research not only in Greek cultural settings, but also in cross-cultural environments in order to support if the abovementioned findings are important in other western cultural settings. A related limitation was difficulty recruiting cognitively healthy family members (other than adult children who accompanied the patients), thus generalizations to wives/husbands is not possible and the fact that perceived gender identity was not examined, but only biological sex. Nevertheless, these findings open the debate about how accurate financial capacity estimations are and what really shapes them, and may have legal consequences as it seems that the biological sex of the older patients drives Greek family caregivers (regardless of their own sex) to consider them as financially incapable.

CONFLICT OF INTEREST

The authors have no conflict of interest to report.

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