

Relationships between gender, age, family conditions, physical and mental health, and social isolation of elderly caregivers

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ABSTRACT

Background: In an aging population an increasing number of elderly caregivers will be called upon to provide care over a long period, during which time they will be burdened both by caregiving and by the physiological effects of their own aging. Among them there will be more aged male caregivers, who will probably be less prepared than women to become caregivers. The aim of this study was to investigate the relationship between caregivers' gender, age, family income, living arrangements and social support as independent variables, and depressive symptoms, comorbidities, level of frailty, grip strength, walking speed and social isolation, as dependent variables.

Methods: 176 elderly people (123 women) were selected from a sample of a population-based study on frailty ($n = 900$), who had cared for a spouse (79.3%) and/or parents (31.4%) in the past five years (mean age = 71.8 ± 4.86 years; mean monthly family income in minimum wages = 4.64 ± 5.14). The study used questionnaires and self-report scales, grip strength and walking speed tests.

Results: 65% of participants evaluated caregiving as being very stressful. Univariate analyses of regression showed low family income as a risk factor for depression; being female and low perceived social support as a risk for comorbidities; being 80 years of age and above for low grip strength; and being male for social isolation indicated by discontinuity of activities and social roles. In multivariate analyses of regression, poverty arose as a risk factor for depression and being female for comorbidities.

Conclusions: Gender roles, age, income and social support interacted with physical and emotional health, and with the continuity of social participation of elderly caregivers. Special attention must be given to male caregivers.

Key words: caregiving, burden, health, psychological well-being, social engagement

Introduction

Increasing life expectancy and the growing number of people aged 80 years and above in the population have led to a higher number of elderly caregivers who are caring for other aged persons for longer periods than in the past. Over several years they will experience the effects of physiological aging and the

consequences of caregiving itself. Low resistance to stressors, lowering of the immune system, fatigue, anorexia, non-intentional weight loss and physical inactivity, all of which are frequently associated with caregiving, are also manifestations that are inherent to frailty (Vitaliano *et al.*, 2007; Oswald, 2009). The prevalence of frailty is highest among the oldest old, women, the poorest and the least educated old people (Vitaliano *et al.*, 2007). These are also the groups with particular susceptibility to the adverse effects of family caregiving (Pinquart and Sörensen, 2003a; 2003b; Vitaliano *et al.*, 2003; Borg and Hallberg, 2006; Mackenzie *et al.*, 2009).

Caring for family members is widely acknowledged to be a source of physical, psychological

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and social burden. These burdens have negative effects on several aspects of caregivers' well-being, such as their physical and mental health (Oswald, 2009), functional capacity (Fried *et al.*, 2001), cognition (Pinquart and Sörensen, 2007), and life satisfaction, with negative repercussions over professional, family and marital roles and daily activities (Pinquart and Sörensen, 2006). Meta-analyses have shown that the physical health of caregivers is worse than the health of non-caregivers, as indicated by subjective measures of health (Giacomin *et al.*, 2005) and by objective measures such as stress hormones, antibodies and medication use (Robinson *et al.*, 2009).

Pinquart and Sörensen (2003a) have observed stronger associations of health problems with depressive symptoms than with the objective stressors that are inherent in care. Stronger associations of caregiving stress and health variables have been observed among older caregivers, caregivers of elderly dementia patients and male caregivers. However, when the effects of gender on stressors and social resources were statistically controlled for, the effects of gender on depression and caregivers' physical health were nearly the same as those observed in non-caregivers (Pinquart and Sörensen, 2003b; Vitaliano *et al.*, 2003).

The lack of instrumental support through having a limited number of potential caregivers in the family may exacerbate the tension associated with care. Likewise, overcrowding and competition for resources that characterize very poor multigenerational families may worsen the conditions of care. Brazilian caregivers, especially those who are poor, have few options for supervision and for obtaining informational, instrumental and emotional support from healthcare professionals (Giacomin *et al.*, 2005). The lack of formal support results in greater demands on family resources and especially on women, and is likely to be detrimental to their physical and psychological health. According to Robinson *et al.* (2009), caring *per se* does not lead to depressive symptoms, health problems and social isolation unless it is accompanied by cohabitation, insufficient income to meet basic needs and a lack of formal support services.

In a large number of studies, emotional support provided by the informal support network has been evaluated quite positively by caregivers (Pinquart and Sörensen, 2006; Huang *et al.*, 2008; Kaufman *et al.*, 2010; Koerner *et al.*, 2010). This support is associated with life satisfaction and better health and has moderating effects on personal reactivity to care-related chronic stressors (McNeill *et al.*, 2009). In the study by Huang *et al.* (2008), low-income caregivers who cared for elderly people with behavioral problems were more likely to suffer

from depression. However, within this group of caregivers, those who relied on emotional support were better protected against depressive symptoms.

In addition to increased risks to physical and mental health, caregiving can create barriers to a satisfactory social life for caregivers. Commonly they complain of lack of privacy, impediments to the right to maintain personal interests, conflicts between the demands of caregiving and the performance of other social activities and roles, and disengagement from social activities performed outside home. The exercise of social activities and roles is important to self-esteem and the perception of one's self, as their frequency, variety and end results allow individuals to be evaluated as more or less productive, socially engaged and active (Pinquart and Sörensen, 2003b; Borg and Hallberg, 2006; Elliot and Pezent, 2008). Under the influence of complex cultural variables, performing social activities and roles outside the home may be more important to the well-being of men than women. Therefore, the deprivation of opportunities to take part in such activities and roles may be more stressful to men. Limits to social involvement and roles tend to enhance the effects of stress, especially when associated with a scarcity of instrumental support, information, and caregiving skills. Because of cultural variables, men may be less likely to develop caregiving skills and to obtain help.

Given an increasing number of elderly caregivers, and given that caregiving can place an additional burden on frail bodies and limited resources, it is relevant to investigate the variables involved in the relationship between caring and the well-being of elderly caregivers. Knowledge about the interactions between gender and age of caregivers, caregiving conditions (family income, living arrangements and perceived social support), caregivers' physical and mental health (indicated by the number of reported chronic illnesses, depressive symptoms and frailty indicators), and social isolation (indicated by the number of social activities and roles they no longer perform) may contribute to the understanding of the mechanisms related to the well-being of female and male elderly caregivers. Such knowledge may also yield suggestions for physical and mental health interventions that might promote better quality of life for the caregivers and to the elderly individuals who receive that care.

The current study involved a sample of elderly caregivers aged 65 years and older who had cared for a spouse or parents within a period of five years preceding data collection. The first aim of the study was to describe the sample in terms of sociodemographic characteristics, health and care conditions. The second objective was to investigate relationships between gender, age

and circumstances of family life, as independent variables, and health conditions and social isolation as dependent variables. The hypothesis to be tested was that being older, male, and having challenging living arrangements and limited support would be associated with adverse health and social outcomes. These issues have been little explored in studies of Latin American elderly populations where the familial organization may differ from that of Anglo-Saxon elderly people, who are represented much more strongly in the international gerontological literature.

Methods

This study involved elderly caregivers who were selected from a population-based study of elderly people residing in Campinas (N = 900), a city located in the southeast region of Brazil, which has an estimated population of 1,024,862 residents (2010 census). Eighty-eight of the 835 urban primary sampling units (PSU) were randomly drawn and their households were visited by a team of trained recruiters. The elderly people who fulfilled the inclusion criteria of the study (being 65 years of age and older, permanently residing in the home and living within the census area, and able to understand the instructions) were invited to participate in a study that aimed to gather information on frailty and associated variables, such as sociodemographic characteristics, health, cognition, functional capacity and psychosocial variables. In this phase, the exclusion criteria, adapted from Ferrucci *et al.* (2004), were the following: (1) severe cognitive deficit suggestive of dementia; (2) use of a wheelchair or being bedridden; (3) sequelae of stroke with localized loss of strength and aphasia; (4) advanced or unstable Parkinson's disease; (5) severe hearing or vision impairment, with severe consequences for communication; and/or (6) being terminally ill.

Participants

In the initial phase of data collection, the participants' scores on the Mini-Mental State Examination (MMSE) were used to exclude 211 elderly people. The cut-off scores were education adjusted and represented the means reported for each education level minus the standard deviation reported for the group: 17 points for the illiterate, 22 for those with 1 to 4 years of schooling, 24 for those with 5 to 8 years of schooling, and 26 for those with 9 or more years (Brucki *et al.*, 2003).

Of the 689 elderly individuals who completed the protocol, 176 (123 women) were selected to participate in this study on the basis of replying

affirmatively to one of two questions that denoted being a caregiver: "*In the past five years, have you had to care for a sick parent? In the last five years, have you had to care for a sick spouse?*". As participants were 65 and older, some of them might have reported caregiving experiences which occurred when they were 60 to 65 years old.

Data collection

Data collection took between 40 to 120 minutes, and was carried out in community centers, by a team composed of students and professionals in the field of gerontology. These team members collected data on sociodemographic variables, cognitive status, general and oral health status, frailty criteria (physical activity, fatigue, unintentional weight loss, grip strength, walking speed), anthropometric characteristics (weight, height, and waist, abdomen and hip circumference), systolic and diastolic pressure, use of health services, functional status, expectations of care, perceived social support, depressive symptoms, stressful experiences, and overall life satisfaction referenced to specific domains (health, cognition, social relationships and environment).

Instruments and measurements

The variables of interest were investigated using the following measurements:

- 1) *Age, gender and family income.* The questions included birth date, gender and monthly family income in gross values. Participants were classified into four age groups (65–69; 70–74, 75–79, and 80 years and above), two gender groups and five income groups according the number of minimum wages earned monthly by the members of the participants' family (≤ 1 ; 1.1–3; 3.1–5; 5.1–10; > 10 minimum wages).
- 2) *Caregiver stress.* This was evaluated by an item of the Elders Life Stress Inventory (ELSI) (Fortes-Burgos *et al.*, 2008) that asked: "*In the last 5 years have you cared for your spouse or your parents?*" If answered positively, they were asked to classify the intensity of the stress generated by this experience on a scale from 1 to 5, in which 5 was the highest value.
- 3) *Living arrangements.* This variable was assessed by a self-report question with six dichotomous items. The question asked whether the elderly participant lived alone; only with a spouse; with a spouse and child (or children); with a spouse, children, grandchildren and/or great-grandchildren; with the family of one of the children; with other relatives; with people who were not part of the family, or in mixed arrangements.
- 4) *Perceived social support.* The evaluation included five items that were semantically adapted to Portuguese from the Interpersonal Support Evaluation List (ISEL) (Cohen *et al.*, 1985), each with four

intensities. Cronbach's α obtained for this scale in the sample was 0.70. The items represent four functions of perceived support and assess the perception of the elderly in terms of the availability of people to meet their needs for tangible support (material assistance or instrumental support), sense of belonging or emotional support (affinity for someone from the support network), fostering self-esteem (positive comparisons with others) and informational support (offers of information, suggestions and advice). The scores ranged from 1 to 20. The tertiles were calculated for the scores of the sample. Those who scored ≤ 16 points were considered to have low perceived social support, those who scored between 17 and 19 points had moderate perceived social support, and those who scored 20 points were considered to have high perceived social support.

- 5) *Number of chronic diseases.* Participants were asked whether a physician had told them that they had the following chronic diseases: heart disease; hypertension; diabetes mellitus; CVA / stroke / ischemia; arthritis/rheumatism; osteoporosis; depression; and cancer. The interviewer asked about each of these diseases individually. Affirmative responses were counted and three categories were created: zero, 1 or 2, and 3 or more diseases.
- 6) *Depressive symptoms.* These symptoms were evaluated by the Geriatric Depression Scale (GDS) (Almeida and Almeida, 1999), with 15 items and a cutoff point of ≥ 6 (Cronbach's $\alpha = 0.725$).
- 7) *Frailty.* The frailty criteria were those obtained by Fried *et al.* (2001) from the data of the Cardiovascular Health Study, a prospective population-based study of community-dwelling elderly. According to these authors, participants who met three or more of these criteria were classified as frail, those who met one or two as pre-frail, and those who did not meet any criteria were classified as non-frail. The criteria are:
 - a) *Unintentional loss of weight in the last year* of more than 4.5 kg or than 5% of body weight, adjusted for gender and body mass index (BMI).
 - b) *Fatigue*, indicated by responses of *always* or *almost always* on any one of two items (7 and 20) from the Center for Epidemiological Studies-Depression (CES-D) Scale (Batistoni *et al.*, 2007).
 - c) *Low grip strength*, indicated by values below the first quintile of the sample, adjusted for gender and BMI. For each elderly participant, the average was calculated for three measurements taken with a Jamar portable hydraulic dynamometer using the dominant hand, following the standard protocols. The cut-off scores for men were: $< \text{BMI} \leq 23$: grip strength ≤ 27.00 kg; $23 < \text{BMI} < 28$: grip strength ≤ 28.67 kg; $28 \leq \text{BMI} < 30$: grip strength ≤ 29.50 kg; $\text{BMI} = 30$: grip strength ≤ 28.67 kg. For women the cut-off scores were: $0 < \text{BMI} \leq 23$: grip strength ≤ 16.33 kg;

$23 < \text{BMI} < 28$: grip strength ≤ 16.67 kg; $28 \leq \text{BMI} < 30$: grip strength ≤ 17.33 kg; $\text{BMI} \geq 30$: grip strength ≤ 16.67 kg.

- d) *Low walking speed*, indicated by values above the 80th percentile of time required to travel a distance of 4.6 m, adjusted for height and gender. The average of three measurements was calculated. The cut-off scores for men were: $0 < \text{height} \leq 168$ cm: time ≥ 5.49 seconds; $\text{height} \geq 168$ cm: time ≥ 5.54 seconds. For women the cut-off scores were: $0 < \text{height} \leq 155$ cm: time ≥ 6.61 seconds; $\text{height} > 155$ cm: time ≥ 5.92 seconds.
- e) *Low calorie expenditure* was assessed based on the self-reported frequency and duration of physical exercise and housework performed the previous week (Taylor *et al.*, 1978). It was indicated by the values below the first quintile of the distribution of metabolic rate in kilocalories, adjusted for gender. The cut-off score for men was < 1253.65 kcal/week; for women it was < 2290.48 kcal/week.
- 8) *Social isolation.* This was indicated by a discontinuity of advanced activities of daily living (AADL) performance. The assessment was done using a questionnaire with 13 roles and activities that require physical independence, autonomy, investment of time and motivation. This assessment is based on Reuben *et al.* (1990). The items included: visit and entertain visitors, go to church, go to parties and cultural events, do ballroom dancing, go on short and long trips, drive a vehicle, perform paid and volunteer work, participate in the University of the Third Age and in the community center, and participate in community boards or councils. For each item, there were three response alternatives: *never have done*, *still do* and *stopped doing*. For each elderly participant, the activities in which they had never participated were disregarded, and the frequency of the activities in which they participated and those they stopped performing were counted. The score for each participant was based on the relationship between the two measures.

Ethical procedures

The investigation followed the ethical principles established by the last Declaration of Helsinki and was approved by the Ethics Committee of Research of the Faculty of Medical Sciences of the State University of Campinas (Unicamp), under process 208/2007. At the beginning of the data collection session, the participants were informed of the nature of the study, the procedures, their rights to refuse to participate at any time, the non-invasive character of the measurements, the absence of risks to their physical and mental integrity, and the guaranteed confidentiality of individual data. All who were willing to participate signed an informed consent form. At the end of the data collection session, the

participants were given general guidance on health and how to maintain a healthy lifestyle.

Data analysis procedures

The χ^2 and Fisher's exact tests were used to compare data for the categorical variables, and the Mann-Whitney, Kruskal-Wallis and Dunn tests were used to compare the means for ordinal variables. Univariate and multivariate logistic analyses of regression were conducted in order to investigate relationships between the variables. The significance level was set at $p \leq 0.05$. The statistical software SAS System for Windows, version 8.02 was used for analyses.

Results

The majority of the 176 elderly caregiver participants was female, aged 65 to 74 years, and reported having cared for a spouse. Sixty-nine percent of those who cared for parents and an equal proportion of those who cared for a spouse scored at the highest levels (4 and 5) on the scales of perceived stress. The great majority had a family monthly income varying between 0 and 5 minimum wages (MW). The majority reported living arrangements that included the spouse and/or one or more members of the family. The frequency of those who judged their social support as low was small. Almost half of the caregivers reported not having chronic illnesses, 20% reported depressive symptoms suggestive of depression ($GDS \geq 6$), 17% had low grip strength, and 14% had low walking speed. Almost half were pre-frail and 58% had interrupted more than three AADLs (Table 1).

Their ages ranged between 68 and 90 years, with an average of 71.8 ± 4.86 years. The mean family monthly income was 4.64 (R\$1990.00) ± 4.98 MW (R\$2279.00). There were no statistically significant gender differences for age and income. There were more octogenarians among those with an income that varied from ≤ 1 to 3 MW and more elderly people aged 70–74 years among those with an income over 10 MW.

There were significantly more men living only with a spouse, or living with a spouse and children, and only women lived with their children's family. The highest proportion of elderly people living alone was observed among the poorest participants and the highest frequency of elderly participants living only with a spouse was seen among those who earned more than 10 MW monthly. Only a small part of the sample, regardless of gender, age or income, lived with extended family, consisting of the couple and children, grandchildren and great-grandchildren.

Mixed arrangements included a spouse, direct descendants, other relatives and, more rarely, domestic workers. Few participants reported living in such kinds of family arrangements.

The highest frequency of those with depressive symptoms was found among the poorest participants. Only 5.17% of the elderly caregivers were classified as frail, whereas 48.85% were classified as pre-frail and 45.98% were non-frail. The elderly aged over 80 years and those aged 75–79 years were the most affected in terms of low grip strength.

There were no statistically significant differences between the frequency of participants that evaluated their perceived social support as low, medium or high, according to gender, age and income criteria. More than 50% of participants had abandoned three or more AADLs and 37.36% had discontinued one or two AADLs. Men reported having stopped a significantly higher number of AADLs than women. The octogenarians reported having stopped more AADLs than younger elderly participants (Table 2).

Univariate and multivariate logistic regression analyses were conducted to investigate relationships among gender, age, family income, living arrangements and perceived social support as independent variables, and depressive symptoms, comorbidities, low grip strength, low walking speed and discontinuity of AADLs as the dependent variables.

As a result of these analyses it was observed that every monthly minimum wage earned by the elderly participants corresponded to a decrease of 34.2% in the risk of having depressive symptoms ($GDS \geq 6$); being female represented a two-fold greater risk of having three or more comorbidities; perceiving social support as low increased the risk of having three or more chronic illnesses almost three-fold, in comparison with high perceived social support; being older than 80 years of age represented a four-fold increase in the risk of having low grip strength, in comparison with being younger; and being male represented a four-fold higher risk of social isolation than being female (Tables 3 and 4).

Discussion

The aim of the current study was to describe the profile of a sample of elderly caregivers in terms of their sociodemographic, health and caregiving conditions. An additional aim was to investigate the impact of sociodemographic and caregiving conditions on physical and mental health parameters and social isolation. Results indicated that gender, age, income and low perceived social support were associated with adverse health and social outcomes.

Table 1. Distribution of the caregivers' characteristics (n = 176)

VARIABLES	CATEGORIES	N	%
Sociodemographic			
Gender	Male	51	29.31
	Female	123	70.69
Age in years	65–69	60	34.48
	70–74	76	43.68
	75–79	25	14.37
	80+	13	7.47
Caregiving conditions			
Target of caregiving	Spouse	138	79.31
	Father or mother	54	31.40
Intensity of the stress generated by caring for the spouse	1	12	9.60
	2	6	4.80
	3	26	20.80
	4	7	5.60
	5	74	59.20
Intensity of stress generated by caring for the parents	1	5	10.42
	2	5	10.42
	3	5	10.42
	4	5	10.42
	5	27	56.25
Circumstances of family life			
Family monthly income	≤ 1 MW	15	9.43
	1.1 – 3.0 MW	61	38.63
	3.1 – 5 MW	42	26.42
	5.1 – 10 MW	28	17.61
	> 10 MW	13	8.18
Living arrangements	Alone	27	15.61
	Spouse	59	34.10
	Spouse/children	29	16.76
	Spouse/childrens' family	11	6.36
	Childrens family	31	17.92
	Other relatives	5	2.89
	Others	1	0.58
Perceived social support	Mixed	11	5.78
	Low	30	17.65
	Middle	81	47.65
	High	59	34.71
Caregivers' physical and mental condition			
Number of chronic illnesses	0	21	45.98
	1–2	73	48.85
	3 or more	80	5.17
Depressive symptoms ≥ 6	–	35	20.11
Low grip strength	–	30	17.24
Low walking speed	–	25	14.45
Level of frailty	Not-frail	80	45.98
	Pre-frail	85	48.85
	Frail	9	5.17
Number of interrupted advanced activities of daily living	0	8	4.60
	1–2	65	37.36
	3 or more	101	58.05

The percentage of caregivers in the sample was comparable to that reported by Giacomini *et al.* (2005) in the study of Bambuí, a previous Brazilian population-based study of community-dwelling elderly people. The distribution of the sample

by gender, age, and type of living arrangement was comparable to that of the population of Campinas (IBGE, 2009). The predominant living arrangements for both genders were conjugal family and husband, wife and children living in the same

Table 2. Descriptive statistics for age, gender, family income, depressive symptoms, number of chronic diseases, social support and number of discontinued AADL

		N	MEAN	SD	MIN.	MEDIAN	MAX.	p-VALUE*
Age	Male	51	72.61	4.35	66.00	72.00	85.00	0.053 ^a
	Female	123	71.39	5.03	65.00	71.00	90.00	
Family income	Male	47	5.66	6.71	0.83	4.10	43.01	0.153 ^a
	Female	112	4.22	4.28	0.89	2.95	31.33	
Depressive symptoms	Male	51	3.35	2.50	0.00	3.00	11.00	0.430 ^a
	Female	123	3.79	2.84	0.00	3.00	13.00	
Number of diseases	65–69 years	60	3.62	2.79	0.00	3.00	13.00	0.943 ^b
	70–74 years	76	3.64	2.83	0.00	3.00	13.00	
	75–79 years	25	3.80	2.53	0.00	3.00	10.00	
	80+ years	13	3.69	2.75	0.00	4.00	10.00	
	< 1.0 MW	15	5.20	3.00	1.00	6.00	11.00	0.008^b
	1.1–3.00 MW	61	3.97	2.61	0.00	4.00	11.00	
	3.1–5. MW	42	3.24	2.55	0.00	3.00	13.00	
	5.1–10.0 MW	28	3.14	3.00	0.00	2.00	6.00	
	> 10 MW	13	2.08	1.50	0.00	2.00	6.00	
	Male	51	1.67	1.29	0.00	1.00	4.00	<0.001^a
	Female	123	2.74	1.63	0.00	3.00	7.00	
	65–69 years	60	2.62	1.69	0.00	3.00	13.00	0.642 ^b
	70–74 years	76	2.37	1.63	0.00	2.00	6.00	
	75–79 years	25	2.36	1.52	0.00	2.00	7.00	
	80+ years	13	2.00	1.29	0.00	2.00	4.00	
Perceived social support	< 1.0 MW	15	3.00	1.60	0.00	3.00	6.00	0.227 ^b
	1.1–3.00 MW	61	2.43	1.55	0.00	2.00	6.00	
	3.1 = 5. MW	42	2.17	1.53	0.00	2.00	6.00	
	5.1–10.0 MW	28	2.46	1.53	0.00	2.00	6.00	
	> 10 MW	13	1.77	1.54	0.00	2.00	5.00	
	Male	51	17.27	3.14	7.00	18.00	20.00	0.544 ^a
	Female	123	16.93	3.22	7.00	18.00	20.00	
	65–69 years	59	16.88	3.45	7.00	18.00	20.00	0.995 ^b
	70–74 years	74	17.04	3.14	7.00	18.00	20.00	
	75–79 years	24	17.38	2.65	12.00	18.00	20.00	
	80+ years	13	17.08	3.43	10.00	18.00	20.00	
	< 1.0 MW	15	15.80	3.67	10.00	17.00	20.00	0.227 ^b
	1.1–3.00 MW	60	16.73	3.10	10.00	17.50	20.00	
	3.1 = 5. MW	42	17.62	3.13	7.00	18.00	20.00	
	5.1–10.0 MW	26	17.00	2.94	9.00	17.00	20.00	
Number of discontinued AADL	> 10 MW	13	17.38	3.73	7.00	19.00	20.00	
	Male	51	3.61	1.76	1.00	3.00	8.00	<0.001
	Female	123	2.74	1.63	0.00	3.00	7.00	
	65–69 years	60	2.62	1.75	0.00	2.00	9.00	0.037^b
	70–74 years	76	3.14	1.76	0.00	3.00	8.00	
	75–79 years	25	3.36	1.85	0.00	3.00	7.00	
	80+ years	13	4.15	2.03	1.00	4.00	8.00	
	< 1.0 MW	15	3.27	2.37	0.00	3.00	8.00	0.676
	1.1–3.00 MW	61	3.15	1.48	0.00	3.00	7.00	
	3.1 = 5. MW	42	2.81	1.86	0.00	2.00	7.00	
	5.1–10.0 MW	28	3.36	2.21	1.00	3.00	9.00	
	> 10 MW	13	2.62	1.66	0.00	2.00	6.00	

*sign. if ≤ 0.05 ; ^a Mann-Whitney; ^b Kruskal-Wallis and *post hoc* of Dunn.
 MW = minimum wage; AADL = advanced activities of daily living

Table 3. Univariate logistic regression analyses for depressive symptoms (1), frailty (2), number of chronic diseases (3), low grip strength (4), low walking speed (5), and discontinuity of three or more AADL (6) (n = 174)

VARIABLES	CATEGORIES	(1)			(2)			(3)			(4)			(5)			(6)		
		<i>p</i>	OR ^a	CI ^b	<i>p</i>	OR ^a	CI ^b	<i>p</i>	OR ^a	CI ^b	<i>p</i>	OR	CI	<i>p</i>	OR	CI	<i>p</i>	OR ^a	CI ^b
Gender	Males (ref.) ^c	–	1.00	–	–	1.00	–	–	1.00	–	–	1.00	–	–	1.00	–	<0.001	4.02	1.92–8.41
	Females	0.602	1.25	0.54–2.90	0.130	1.66	0.86–3.21	0.033	2.14	1.07–4.31	0.727	1.17	0.48–2.84	0.216	0.58	0.24–1.38	–	1.00	1.00
Age	65–69 (ref.) ^c	–	1.00	–	–	1.00	–	–	1.00	–	–	1.00	–	–	1.00	–	–	1.00	–
	70–74	0.666	0.83	0.35–1.97	0.911	1.04	0.53–2.05	0.116	1.73	0.87–3.44	0.794	0.87	0.32–2.42	0.714	1.23	0.41–3.66	0.339	0.72	0.36–1.42
	75–79	0.422	1.56	0.53–4.57	0.716	1.19	0.47–3.04	0.328	1.60	0.62–4.13	0.051	3.06	0.99–9.40	0.101	2.84	0.82–9.89	0.520	0.74	0.29–1.88
	≥80	0.804	1.20	0.29–5.05	0.255	2.10	0.58–7.58	0.072	3.56	0.89–14.25	0.041	4.06	1.06–15.56	0.061	4.00	0.94–17.03	0.391	0.59	0.17–1.99
Family income (as continuous variable)	–	0.003	0.658	0.501–0.863	0.269	0.963	0.901–1.029	0.100	0.933	0.858–1.013	0.159	0.892	0.762–1.46	0.105	0.835	0.672–1.038	0.634	0.985	0.927–1.047
Perceived social support	High (ref.) ^c	–	1.00	–	–	1.00	–	–	1.00	–	–	1.00	–	–	1.00	–	–	1.00	–
	Medium	0.391	1.48	0.61–3.59	0.167	1.61	0.82–3.17	0.992	1.00	0.51–1.97	0.551	1.33	0.52–3.42	0.320	1.69	0.60–4.74	0.921	1.04	0.53–2.04
	Low	0.351	1.69	0.56–5.10	0.821	1.11	0.46–2.67	0.043	2.77	1.03–7.45	0.249	1.94	0.63–5.99	0.656	1.36	0.35–5.24	0.328	1.55	0.64–3.76
Living arrangements	Spouse (ref.) ^c	–	1.00	–	–	1.00	–	–	1.00	–	–	1.00	–	–	1.00	–	–	1.00	–
	Spouse and children	0.362	0.57	0.17–1.92	0.497	0.73	0.30–1.79	0.584	1.29	0.52–3.20	0.976	1.02	0.28–3.71	0.752	0.82	0.23–2.87	0.929	0.96	0.39–2.37
	Expanded family	0.705	1.33	0.31–5.73	0.667	0.75	0.21–2.74	0.307	2.10	0.51–8.71	0.262	2.39	0.52–10.95	0.424	1.84	0.41–8.16	0.850	1.13	0.31–4.14
	Family of a child	0.298	0.52	0.16–1.77	0.617	1.25	0.52–3.01	0.921	0.96	0.40–2.29	0.742	1.23	0.36–4.12	0.616	0.73	0.21–2.54	0.262	1.65	0.69–3.97
	Alone	0.984	1.01	0.34–3.03	0.124	2.14	0.81–5.66	0.724	0.85	0.34–2.12	0.317	1.82	0.56–5.89	0.486	0.61	0.15–2.43	0.887	0.94	0.37–2.36
	Others	0.446	1.61	0.47–5.47	0.857	0.90	0.30–2.73	0.638	1.31	0.42–4.09	0.276	2.13	0.55–8.24	0.305	0.33	0.04–2.76	0.158	2.27	0.73–7.06

*Sig, if ≤ 0.05; ^aOR = Odds ratio; ^bCI = confidence interval (95%); ^cref = level of reference.

Table 4. Multivariate logistic regression analyses over depressive symptoms ≥ 6 and number of chronic diseases ($n = 174$).

VARIABLES	CATEGORIES	DEPRESSIVE SYMPTOMS >6			NUMBER OF CHRONIC DISEASES		
		P	OR ^a	CI ^b	P	OR ^a	CI ^b
Gender	Males (ref.) ^c	—	—	—	—	1.00	—
	Females				<0.001	4.09	1.85–9.07
Age	65–69 (ref.) ^c						
	70–74						
	75–79	—	—	—	—	—	—
	≥ 80						
Family income as continuous variable		0.002	0.612	0.452–0.829	—	—	—
Perceived social support	High (ref.) ^c						
	Medium	—	—	—	—	—	—
	Low						
Living arrangements	Partner (ref.) ^c						
	Partner and children						
	Expanded family	—	—	—	—	—	—
	Family of a child						
	Alone						
	Others						

*Sig, if ≤ 0.05 ; ^aOR = odds ratio; ^bCI = confidence interval (95%); ^cref = level of reference.

household, which may be due to the fact that there was a predominance of elderly people younger than 75 years of age in the sample. Twenty-five percent of women were living with the family of one of their children, but men were not found in this type of living situation at all. This reflects greater female longevity and the existing practices in Brazil in this generation of women who tend to marry older men and, when widowed in old age, do not remarry. A limited number of elderly people were living with their extended family. This may reflect the influence of urbanization and the decline in fertility and birth rates in Brazil in recent decades.

In the current study, depressive symptoms were strongly associated with poverty among elderly caregivers. It is worth noting the high frequency of elderly people living alone, which is far greater than in the general population. However, living alone may not linearly explain the physical and mental health problems of caregivers as caring does not necessarily lead to depression, chronic diseases and social isolation (Pinquart and Sörensen, 2006). It is possible that a substantial number of elderly lived alone due to the death of the spouse for whom they had provided care. The fact that most of the elderly people with a high number of depressive symptoms were poor indicates the lower levels of protection and worse emotional and physical health conditions within this income level.

As in other studies, the sample scored highly on perceived social support (Robinson *et al.*, 2009; Koerner *et al.*, 2010). This is possibly due to the predominance of women in the sample. Women are better able to call on social support and receive greater benefits from the protective effects of this type of support against the chronic stress associated with care as compared to men (Robinson *et al.*, 2009). Consistent with these data, the perception of low social support was associated with a greater probability of AADL discontinuity.

The higher rates of comorbidities found among women in comparison to men were expected given the available accounts in the gerontological and caregiving literature (Pinquart and Sörensen, 2006; 2007; Huang *et al.*, 2008; Koerner *et al.*, 2010). The lower grip strength in older caregivers was expected because of the impact of the physiological aging process, which determines that older people have less muscle strength due to sarcopenia and that the physical functions that depend on strength decline proportionally to the losses in structure (Oswald, 2009). This fact may explain the greater frequency of older people who abandon AADLs. It is possible that AADL discontinuity is a form of selection used by the very elderly to allow physical investment in caregiving tasks, which, in the context of their lives, are more necessary and urgent. It is also possible that a selection process of social

activities occurs, which may favor the activities with lower requirement for involvement with social partners and with varied activities. In both cases, discontinuity would be an adaptation strategy and not a form of withdrawal determined by the decline of functionality.

However, in this research, men stopped practicing AADL more often than women; this finding was unexpected as they generally have better health and functional conditions and higher social status and participation than women. As the majority of men had fewer chronic diseases, less frailty and higher muscle strength than women, the reasons for discontinuing AADLs were not due to functional incapacity. Therefore, it may be inferred that caring implies a greater deprivation of contacts and complex social activities outside of the home for men than for women. It is possible that a lack of caring abilities, which are more associated with female than male roles, leads men to require more time to perform these tasks than women. It is also possible that women are able to integrate the housework and the instrumental support tasks in such a way that they are able to perform one as if it were a natural extension of the other and both as part of their obligations and feminine identity. Men may suffer more from the lack of social support than women, or may be less competent in promoting such support. Furthermore, perhaps the schedule of care activities, which frequently includes housework, rivals the schedule of complex male social activities in terms of type, time and organization adopted by non-caregiver male social partners. These data replicate those found in the meta-analysis developed by Pinquart and Sörensen (2007) on studies on the health of caregivers. Male elderly caregivers, whose number tends to increase with age (IBGE, 2009), deserve more attention as a risk group while they care for a family member, and when they find themselves left alone due to the death, institutionalization or transfer of their spouse to another residence.

The logistic regression analyses showed family income as robustly associated with depressive symptoms, and female gender associated with having three or more diseases. These results are compatible with those of Huang *et al.* (2008) and Pinquart and Sörensen (2007). However, the effects of low income are not restricted to old age. Poor elderly people were likely to have been socially disadvantaged throughout their lives. Their development would have been affected by exposure to chronic and recurrent stressors generated by the lack of economic resources (Kahn and Pearlin, 2006). Poverty may be associated with many adverse variables that weaken the resistance to health risk factors.

In the context of the Aging, Stress and Health Study, Kahn and Pearlin (2006) examined the relationships between persistent financial disadvantages occurring throughout life and health status in old age. The study revealed a strong impact of economic disadvantage that occurred early and throughout life on the conditions of health that manifested in the number and severity of symptoms, incapacity, depression and negative self-evaluations of health, even when controlling for the effects of income levels on old age. Thus, economic disadvantages experienced before the age of 35 years caused impairments to health and these impairment were present after the age of 35. Financial problems that began in middle age did not have deleterious effects on health in old age. It was further shown that the *persistence* of difficulties was more relevant than episodic events. The adverse effects of social inequality on late-onset depression are more robust than the effects of individual income or mean income of the population (Lorant *et al.*, 2003; Ladin *et al.*, 2009).

For the elderly who were very poor and who have lived under severe conditions of social inequality throughout their entire lives, old age only exacerbates the physiological, social and psychological disadvantages that are likely to occur at this stage. These disadvantages interacted with chronic deprivation of opportunities to care for their health and to have their loved ones equally well cared for and educated. In agreement with these findings, a higher prevalence of chronic diseases, frailty, incapacities, depression and cognitive deficit was observed among the elderly who experienced greater poverty, particularly the women and the less educated.

In caregiving situations, these adverse conditions co-vary with the lack of information about the changes that patients are going through and about what the caregivers must do in relation to the person for whom they provide care (Elliot and Pezent, 2008). These conditions are associated with a lack of instrumental help from the formal support network, difficulties in coping with crisis situations and insufficient money to meet the family and care needs. At the same time, the caregivers must subsist with reduced opportunities to access health services and to participate in activities, social interactions and the fulfillment of significant roles for the maintenance of the self.

The nature of the data does not allow for determination of cause and effect relationships between caring and the other variables considered because this was not a longitudinal or experimental study. Because of the inherent difficulty in separately controlling for the effects of each examined variable, the results could not be independently

attributed to aging or care. Limitations due to the design, among them the size of the sample, the absence of equal numbers of men and women, the family relations and the lack of information on the circumstances of care (for instance, its duration and continuity at the time of the interview, as well as the long period of five years comprehended by the question about caregiving, which can give rise to memory distortions) do not allow for broad generalization. New longitudinal studies with larger sample sizes that compare caregivers and non-caregivers could indicate other relationships and clarify the relationships found in the current study.

Despite these limitations, this study offers indicators for understanding the multiple variables involved in family care that is provided to the elderly by other elderly people, especially men. Caregiving is an increasingly common event that affects women, men, the family and other social institutions. Its characterization as a process rooted in the life history of individuals and families, including cultural and macro-structural factors, aids the understanding of these relationships.

Conflict of interest

None.

Description of authors' roles

Anita Liberalesso Neri was the coordinator of the main project, planned this study and had the main responsibility for writing the paper; Mônica Sanches Yassuda was co-coordinator of the main project and participated in the preparation of the paper; Andrea Cristina Garofe Fortes-Burgos, Efigênia Passarelli Mantovani, Flávia Silva Arbex Borim and Stella Vital de Souza Torres were responsible for the recruitment of participants and for the data collection; Mônica Rodrigues Perracini and Maria Elena Guariento reviewed the paper.

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References

- Almeida, O. P. and Almeida, S. A. (1999). Short versions of the Geriatric Depression Scale: a study of their validity for the diagnosis of major depressive episode according to ICD-10 and DSM-IV. *International Journal of Geriatric Psychiatry*, 14, 858–865.
- Batistoni, S. S. T., Neri, A. L. and Cupertino, A. P. F. B. (2007). Validade da escala de depressão do Center for Epidemiological Studies (CES-D) entre idosos brasileiros. *Revista Saúde Pública*, 41, 598–605.
- Borg, C. and Hallberg, I. R. (2006). Life satisfaction among informal caregivers in comparison with non-caregivers. *Scandinavian Journal of Caring Science*, 20, 427–438.
- Brucki, S. M. D., Nitrini, R., Caramelli, P., Bertolucci, P. H. F. and Okamoto, I. H. (2003). Sugestões para o uso do Mini-Exame do Estado Mental no Brasil. *Arquivos de Neuropsiquiatria*, 61, 777–781.
- Cohen, S., Mermelstein, R., Kamarck, T. and Hoberman, H. M. (1985). Measuring the functional components of social support. In G. Sarason and B. R. Sarason (eds.), *Social Support: Theory, Research, and Applications* (pp. 73–94). The Hague: Martinus Nijhoff.
- Elliot, T. R. and Pezent, G. D. (2008). Family caregivers of older persons in rehabilitation. *Neurological Rehabilitation*, 23, 439–446.
- Ferrucci, L., Guralnik, J. M., Studenski, S., Fried, L. P., Cutler Jr, G. B. and Walston, J. D. (2004). Designing randomized, controlled trials aimed at preventing or delaying functional decline and disability in frail, older persons: a consensus report. *Journal of the American Geriatrics Society*, 52, 625–624.
- Fortes-Burgos, A. C. G., Neri, A. L. and Cupertino, A. P. F. B. (2008). Eventos estressantes, estratégias de enfrentamento, auto-eficácia e sintomas depressivos entre idosos residentes na comunidade. *Psicologia: Reflexão e Crítica*, 2, 74–82.
- Fried, L. P. *et al.* (2001). Frailty in older adults: evidence for a phenotype. *Journal of Gerontology*, 56, 146–156.
- Giacomin, K., Uchoa, E., Firmo, J. O. A. and Lima-Costa, M. F. (2005). Projeto Bambuí: um estudo de base populacional da prevalência e dos fatores associados à necessidade de cuidador entre idosos. *Cadernos de Saúde Pública*, 21, 80–91.
- Huang, C., Souza, V. D., Perng, S., Hwang, M., Tsai, C., Huang, M. and Yao, S. (2008). Stressors, social support, depressive symptoms and general health status of Taiwanese caregivers of persons with stroke or Alzheimer's disease. *Journal of Clinical Nursing*, 18, 502–511.
- IBGE (2009). *Indicadores Sociodemográficos e de Saúde no Brasil*. Estudos e pesquisas: informações demográficas e socioeconômicas, 25 [Health and Sociodemographic Indicators in Brazil. Studies and Research: Demographic and Socioeconomic data]. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística. Available at: http://www.ibge.gov.br/home/estatistica/populacao/indic_sociosaude/2009/default.shtm; last accessed 9 March 2009.
- Kahn, J. R. and Pearlin, L. I. (2006). Financial strain over the life course and health among older adults. *Journal of Health and Social Behavior*, 47, 17–31.
- Kaufman, A. V., Kosberg, J. I., Leeper, J. D. and Tang, M. (2010). Caregiver burden, and life satisfaction in a sample of rural African American and White caregivers of older persons with dementia. *Journal of Gerontological Social Work*, 53, 251–269.
- Koerner, S. S., Shirai, Y. and Kenyon, D. Y. B. (2010). Sociocontextual circumstances in daily stress reactivity

- among caregivers for elders relatives. *Journals of Gerontology: Psychological Sciences*, 65, 561–572.
- Ladin, K., Daniels, N. and Kawachi, I.** (2009). Exploring the relationship between absolute and relative position and late-life depression: evidence from 10 European countries. *The Gerontologist*, 50, 48–59.
- Lorant, V., Delière, D., Eaton, W., Robert, A., Philpott, P. and Ansseau, M.** (2003). Socioeconomic inequalities in depression: a meta-analysis. *American Journal of Epidemiology*, 157, 98–112.
- Mackenzie, C. S., Wiprzycka, U. Z., Hasher, L. and Goldstein, D.** (2009). Associations between psychological distress, learning, and memory in spouse caregivers of older adults. *Journals of Gerontology: Psychological Sciences*, 64, 742–746.
- McNeill, G., Kosberg, J. I., Durkin, D. W., Dooley, W. K., de Coster, J. and Williamson, G. M.** (2009). Caregiver mental health and potentially harmful caregiving behavior: the central role of caregiver anger. *The Gerontologist*, 50, 76–86.
- Oswald, S.** (2009). Who is caring for the caregivers? Promoting spousal caregiver's health. *Family Community Health* (Suppl. 1), 32, 5–14.
- Pinquart, M. and Sörensen, S.** (2003a). Predictors of caregiver burden and depressive mood: a meta-analysis. *Journals of Gerontology: Psychological Sciences*, 58, 112–128.
- Pinquart, M. and Sörensen, S.** (2003b). Differences between caregivers and non-caregivers in psychological and physical health: a meta-analysis. *Psychology and Aging*, 8, 250–267.
- Pinquart, M. and Sörensen, S.** (2006). Gender differences in caregiver stressors, social resources, and health: an updated meta-analysis. *Journals of Gerontology: Psychological Sciences*, 61, 33–45.
- Pinquart, M. and Sörensen, S.** (2007). Correlates of physical health of informal caregivers: a meta-analysis. *Journals of Gerontology: Psychological Sciences*, 62, 126–137.
- Reuben, D. B., Laliberte, L., Hiris, J. and Mor, V.** (1990). A hierarchical exercise scale to measure function at the Advanced Activities of Daily Living (AADL) level. *Journal of the American Geriatrics Society*, 38, 855–861.
- Robinson, J., Fortinsky, R., Kleppinger, A., Shigue, N. and Porter, M.** (2009). A broader view of family caregiving: effects of caregiver conditions on depressive symptoms, health, work, and social isolation. *Journals of Gerontology: Social Sciences*, 64, 788–798.
- Taylor, H. L., Jacobs, D. R., Schucker, B., Knudsen, J., Leon, A. S. and Debacker, G.** (1978). A questionnaire for the assessment of leisure time physical activities. *Journal of Chronic Disease*, 31, 741–755.
- Vitaliano, P., Zhang, J. and Scanlan, J.** (2003). Is caregiving hazardous to one's health: a meta-analysis. *Psychological Bulletin*, 129, 946–972.
- Vitaliano, P., Echeverria, D., Shelkey, M., Zhang, J. and Scanlan, J.** (2007). A cognitive psychophysiological model to predict functional decline in chronically stressed older adults. *Journal of Psychology and Medical Settings*, 14, 177–190.