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Work, social support and leisure protect the elderly from functional loss: EPIDOSO Study

ABSTRACT

OBJECTIVE: To identify risk factors for functional capacity loss in elderly people.

METHODS: Epidoso (Epidemiology of the Elderly) cohort study with elderly people living in São Paulo (Southeastern Brazil). A total of 326 participants in the first interview (1991-1992) who were independent or had mild dependence (one or two activities of daily living) were selected. Those who presented functional loss in the second (1994-1995) or third interviews (1998-1999) were compared to those who did not present it. The incidence of functional loss was calculated according to sociodemographic variables, life habits, cognitive status, morbidity, hospitalization, self-rated health, tooth loss, social support and leisure activities. Crude and adjusted relative risks with 95% confidence intervals were estimated through bivariate and multiple analyses with Poisson regression. The criterion for the inclusion of the variables in the model was p < 0.20 and for exclusion, p > 0.10.

RESULTS: The incidence of functional loss was 17.8% (13.6; 21.9). The risk factors in the final model were: age group 70-74 years RR=1.9 (0.9;3.9); age group 75-79 years RR=2.8 (1.4;5.5); age group 80 years or older RR=5.4 (3.0;9.6); score in the mini-mental state examination <24 RR=1.8 (1.1;2.9); asthma RR=2.3 (1.3;3.9); hypertension RR=1.7 (1.1;2.6); and diabetes RR=1.7 (0.9;3.0). The protective factors were: paid work RR=0.3 (0.1;1.0); monthly relationship with friends RR=0.5 (0.3;0.8); watching TV RR=0.5 (0.3;0.9); and handcrafting RR=0.7 (0.4;1.0).

CONCLUSIONS: The prevention of functional loss should include adequate control of chronic diseases, like hypertension, asthma and diabetes, as well as cognitive stimulation. Work, leisure and relationships with friends should be valued due to their protective effect.

DESCRIPTORS: Aged. Activities of Daily Living. Leisure Activities. Social Support. Personal Autonomy. Socioeconomic Factors. Cohort Studies.

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INTRODUCTION

Functional capacity involves multiple factors such as autonomy, independence, cognition, financial and social support. In practice, professionals work with the concept of capacity versus incapacity. Functional incapacity can be defined by the degree of difficulty in performing activities of daily living (ADL).[19] In the study called EPIDOSO (Epidemiology of the Elderly) and in others,[7,16,17,18,19] functional capacity is measured through ADL scales. The questions approach basic activities for body or personal maintenance (PADL), like bathing, dressing,

going to the toilet in time, getting in/out of bed, getting up from a chair, feeding oneself, grooming, cutting toenails, climbing a flight of stairs and walking on a level surface; and activities to live independently in the community or instrumental activities (IADL), like preparing meals, shopping, taking a bus, walking to a place near home, taking medications on the right time and cleaning the house.

Risk factors for mortality in elderly people are well established in the literature. International and national studies identify functional incapacity as one of the main predictive factors of mortality in the elderly,[4,6,12,16] and its effect is more important than cognitive status.[6, 16] In a study with people aged 85 years or older, functional incapacity was a better predictor of mortality in elderly individuals than pathologies.[4] There is a well-established link between functional incapacity and mortality. What would be the preceding link, to prevent incapacity?

Verbrugge & Jette[23] (1994) propose a theoretical model of the process of becoming incapable, considering three aspects: (i) predisposing factors (sociodemographic characteristics); (ii) intra-individual factors (lifestyle, morbidities, self-rated health, behavior changes, manners of dealing with difficulties, with diseases and with modifications in activities that can affect the incapacity process); and (iii) extra-individual factors (interventions of the health and rehabilitation services, use of medicines, external supports and physical and social environment).

National cross-sectional studies have examined the possible factors associated with functional incapacity.[1,3,5,7,11,14,19,20] The identification of these factors can subsidize health interventions to increase the survival time free of disabilities. This paper aimed to identify risk factors for functional capacity loss in elderly people.

METHODS

The research used data from a population-based cohort study called EPIDOSO, carried out with elderly individuals living in the community, in a residential area of the municipality of São Paulo (Southeastern Brazil), promoted by the *Centro de Estudos de Envelhecimento* (Center for Aging Studies) of *Escola Paulista de Medicina* of *Universidade Federal de São Paulo*. The participants were followed up during ten years, in four waves of home inquiries. Of the 55 districts of the municipality of São Paulo, the Saúde district was selected. The participants were selected by means of a census that was performed in the 52 census tracts of Saúde, which identified the inhabitants who were older than 65 years as eligible for the study,[17] totaling 1,667 interviewed elderly people. The first inquiry was

conducted in 1991-1992, the second in 1994-1995, the third in 1998-1999, and the fourth in 2000-2001.

The home interviews used the Brazilian Multidimensional Function Assessment Questionnaire (BOMFAQ), adapted from the questionnaire Older Americans Resources and Services (OARS), which has been utilized in cross-sectional studies with elderly people living in São Paulo.[17] The instrument collected information on socioeconomic and demographic characteristics, informal support (not provided by the government or specialized institutions), independence level in the ADL, chronic diseases, mental health, cognition, and self-rated health. The BOMFAQ functional capacity questionnaire includes eight questions related to the ADL: getting in/out of bed, eating, grooming, walking on a level surface, bathing, dressing, going to the toilet in time, and climbing a flight of stairs; and seven questions related to IADL: taking medications on time, walking near home, shopping, preparing meals, cutting toenails, taking a collective means of transport, and cleaning the house, totaling 15 questions.

The participants in the first interview (1991-1992) who were independent or had mild dependence (1 or 2 ADL/IADL) were selected. Functional loss was defined as dependence in seven or more ADL/IADL. Those who presented functional loss in the second (1994-1995) or third interviews (1998-1999) were identified and compared to those who had not presented it up to that time.

The dependent variable was functional loss in the second or third interviews. The independent variables tested were: sociodemographic (sex, age group, marital status, race/color, level of schooling, paid work), life habits (physical and sexual activity), probable cognitive deficit (score in the mini-mental state examination <24), self-reported morbidity (hypertension, asthma, diabetes, cerebrovascular accident, urinary incontinence, insomnia, cataract), falls, hospitalization, tooth loss, self-rated health, social support (monthly relationship with friends, neighbors, relatives, having a confidant friend), leisure activities (trips, handcrafting, games, reading).

Crude and adjusted relative risks were calculated with respective 95% confidence intervals, by bivariate and multiple analyses with Poisson regression (robust variance). The criterion for inclusion of the variables in the model was $p < 0.20$ and for exclusion, $p > 0.10$. The analysis was performed in the Program STATA version 10.0.

The study was approved by the Ethics Research Committee of *Universidade Federal de São Paulo* (Process no. 0593.03) on 5/30/2003.

RESULTS

Among the elderly of the first interview (n = 1667), 972 were identified as independent or with mild dependence. Of these, 326 were interviewed in the second and/or third interviews. There were 646 losses (127 deaths, 221 changes of address and 298 refusals). There were no significant differences between the interviewees and the follow-up losses according to sex, level of schooling, presence of paid work, self-rated health or cognitive impairment. There was a slightly higher percentage of individuals older than 80 years among the losses (14.4%) than among the interviewees (10.4%), which is a statistically significant difference (p = 0.03). The average income of the losses was higher than that of the interviewees (p = 0.03). The incidence of functional loss was 17.8% (95%CI 13.6;21.9), 58 cases in 326 participants.

Among the sociodemographic variables, the bivariate analysis presented higher risk of functional loss for individuals older than 75 years (Table 1).

Higher risk was observed for elderly individuals with poorer self-rated health, asthma, arterial hypertension, diabetes and urinary incontinence. Cognitive impairment (MMSE < 24) also presented association with functional loss (Table 2).

The protective factors were: participating in parlor games, watching TV and handcrafting. Sexual activity was a protection factor, as well as maintenance of paid work (Table 3).

Elderly individuals who reported monthly relationship with friends and having a confidant friend presented lower risk of functional loss (Table 4).

After adjustment by multiple analysis, age between 75 and 79 years or 80 years and more, probable cognitive deficit, arterial hypertension, asthma and diabetes were independent risk factors for functional loss in the final model. Paid work, monthly relationship with friends, watching TV and handcrafting were protective factors (Table 5).

DISCUSSION

Increase in age, cognitive impairment, arterial hypertension, asthma and diabetes were risk factors for functional loss. On the other hand, the maintenance of paid work, monthly relationship with friends, watching TV and handcrafting were independent protection factors.

Self-rated health and sexual life are important predictors of functional incapacity, although they did not remain in

Table 1. Sociodemographic factors associated with functional loss in elderly individuals. São Paulo, Southeastern Brazil, 1991-1999.

Variable	n	%	Crude RR	95%CI	p*
Sex					
Female	202	17.8	1		
Male	124	17.2	0.99	0.61;1.61	0.985
Age group (years)					
65 to 69	136	8.8	1		
70 to 74	84	14.3	1.61	0.76;3.44	0.210
75 to 79	72	19.5	2.20	1.07;4.51	0.031
80 and older	34	58.8	6.67	3.62;12.26	< 0.001
Level of schooling					
High School/Higher Education	104	17.3	1		
Junior High School	57	17.5	1.01	0.50;2.04	0.970
Elementary School	106	16.0	0.92	0.50;1.69	0.805
Illiterate/reads/writes	59	22.0	1.27	0.67;2.41	0.459
Marital status					
Single	30	6.7	1		
Married	195	16.9	2.53	0.64;10.05	0.185
Widow/widower	86	24.4	3.66	0.91;14.73	0.068
Divorced	15	13.3	1.99	0.31;12.87	0.466
Race/color					
White	294	18.4	1		
Mixed/Black	15	6.7	0.36	0.05;2.45	0.299
Yellow	14	14.3	0.77	0.21;2.87	0.706

* Poisson Régression

Table 2. Intra-individual factors (health, morbidities, cognition) associated with functional loss in elderly individuals. São Paulo, Southeastern Brazil, 1991-1999.

Variable	n	%	Crude RR	95%CI	p*
Self-rated health					
Very good	77	9.1	1		
Good	201	17.4	1.91	0.88;4.13	0.098
Poor/very poor	48	33.3	3.66	1.62;8.26	0.002
Asthma					
No	299	16.4	1		
Yes	27	33.3	2.03	1.12;3.67	0.019
Hypertension					
No	208	14.4	1		
Yes	118	23.7	1.64	1.03;2.61	0.035
Diabetes					
No	297	16.5	1		
Yes	29	31.0	1.88	1.03;3.43	0.039
Cerebrovascular accident					
No	319	17.6	1		
Yes	7	28.6	1.62	0.49;5.38	0.425
Urinary incontinence					
No	283	15.9	1		
Yes	43	30.2	1.90	1.12;3.22	0.017
Insomnia					
No	218	16.5	1		
Yes	108	20.4	1.23	0.76;1.99	0.390
Cataract					
No	264	19.3	1		
Yes	62	11.3	0.58	0.27;1.22	0.155
Tooth loss					
No	79	12.7	1		
Partial	88	18.2	1.43	0.69;2.98	0.331
Total	159	20.1	1.58	0.82;3.06	0.167
Falls					
No	229	17.0	1		
Yes	97	19.6	1.15	0.70;1.88	0.580
Hospitalization					
No	308	17.5	1		
Yes	18	22.2	1.26	0.51;3.11	0.605
Cognitive status					
Minimental ≥24	270	13.3	1		
Minimental < 24	56	39.3	2.94	1.88;4.60	<0.001

* Poisson Regression

Table 3. Intra-individual factors (lifestyle) associated with functional loss in elderly individuals. São Paulo, Southeastern Brazil, 1991-1999.

Variable	n	%	Crude RR	95%CI	p*
Physical activity					
No	226	19.5	1		
Yes	100	14.0	0.72	0.41;1.25	0.244
Sexual activity					
No	200	22.5	1		
Yes	115	10.4	0.46	0.25;0.84	0.011
Paid work					
No	274	20.1	1		
Yes	52	5.8	0.29	0.09;0.88	0.030
Travels					
No	80	22.5	1		
Yes	243	16.0	0.71	0.43;1.17	0.184
Parlor games					
No	259	20.1	1		
Yes	66	9.1	0.45	0.20;1.00	0.053
Watches TV					
No	29	31.0	1		
Yes	296	16.6	0.53	0.29;0.97	0.040
Handcrafting					
No	118	22.9	1		
Yes	207	15.0	0.65	0.41;1.04	0.074
Reading					
No	86	21.0	1		
Yes	239	16.7	0.79	0.48;1.31	0.380

* Poisson Regression

There are consensus and particularities in the identification of factors associated with functional capacity loss, like the use of different functional and cognitive assessment scales, which hinders the comparison between studies. Studied variables may contain a subjectivity component, like self-rated heath and self-reported and non-diagnosed diseases.

Scale standardization to measure functional capacity by means of the ADL is necessary to render the studies in the area uniform.

Studies have reported association between increase in age and functional loss.[1,3,5,7,11,14,19] Decrease in muscular and bone mass, in basal metabolism and energy reserve, with the consequent loss of the capacity to react against stressors, accompany the increase in age and may lead to the frailty syndrome, which exposes autonomous elderly people to functional loss and dependence. The prevalence of frailty increases from the age of 65 onwards and reduces survival within each age group. Age and frailty became fuzzy, as they summarize

the final adjusted model. Depression, which is a prevalent morbidity among the elderly, can also generate functional incapacity.[10] This variable (depression) was accessed in the EPIDOSO study, but it was not utilized due to the excess of missing values.

Table 4. Extra-individual factors (social support) associated with functional loss in elderly individuals. São Paulo, Southeastern Brazil, 1991-1999.

Variable	n	%	Crude RR	95%CI	p*
Monthly relationship with relatives					
No	28	21.4	1		
Yes	298	17.5	0.81	0.38;1.72	0.592
Monthly relationship with neighbors					
No	33	24.2	1		
Yes	293	17.1	0.70	0.36;1.35	0.293
Monthly relationship with friends					
No	43	30.2	1		
Yes	283	15.9	0.52	0.31;0.89	0.017
Confidant friend					
No	239	20.1	1		
Yes	87	11.5	0.57	0.30;1.08	0.086

* Poisson Regression

Table 5. Factors associated with functional loss in elderly individuals. São Paulo, Southeastern Brazil, 1991-1999.

Variable	Adjusted RR	95% CI	p*
Age group (years)			
65 to 69	1		
70 to 74	1.94	0.96;3.91	0.066
75 to 79	2.78	1.39;5.53	0.004
80 and older	5.39	3.02;9.60	<0.001
Cognitive status			
Minimental ≥ 24	1		
Minimental < 24	1.77	1.08;2.89	0.024
Hypertension			
No	1		
Yes	1.73	1.14;2.62	0.010
Asthma			
No	1.00		
Yes	2.30	1.32;3.98	0.003
Diabetes			
No	1.00		
Yes	1.68	0.94-3.00	0.081
Paid work			
No	1.00		
Yes	0.34	0.11-1.02	0.056
Monthly relationship with friends			
No	1		
Yes	0.49	0.30;0.80	0.005
Watches TV			
No	1		
Yes	0.48	0.26;0.88	0.019
Handcrafting			
No	1		
Yes	0.63	0.39;1.00	0.051

* Poisson Regression

multiple deficits in many domains.[21] However, the frailty status can be modified, unlike age.

Sectional design studies are limited to apprehend this phenomenon. The national studies about functional capacity have cross-sectional designs that assess the prevalence and factors associated with incapacity. The present study was the first one to assess functional loss in a longitudinal way, i.e., which factors determined the functional capacity loss of elderly people. The comparison with other studies should take methodological differences into account.

Based on the longitudinal view, the earliest functional capacities that are lost are the most complex ones, as they require an accurate and coordinated interaction between several components of the individual. These highly complex functions include from walking to advanced cognitive processes, like executive functions and divided attention. Youths and elderly individuals can be seen as complex systems, but many functions are approaching failure in the elderly;[24] thus, small stressors present greater clinical meaning.

Cognitive impairment has been associated with functional loss and is considered one of the most important risk factors.[8,13] Cognitive impairment frequently starts with difficulties in accomplishing the IADL, like shopping, taking a bus, managing money. These are called executive functions and are lost in early.[13,24] The elderly who present difficulties in these functions cease to accomplish them progressively because their relatives are concerned about the mistakes they make and assume their responsibilities, which aggravates the dependence condition. Executive functions are a fundamental aspect of cognition because they can compensate for functional loss and both together are strong predictors of mortality.[24]

In a review paper about functional incapacity among community elderly, the health conditions that were most frequently associated with functional decline were: hypertension, cerebrovascular accident, diabetes and arthritis.[22] Recent national studies have shown an association between functional incapacity and hypertension and diabetes.[7] Hypertension is a highly prevalent condition in the elderly that can be prevented, treated and controlled. However, the adequate control of hypertension among treated adults and elderly people is low.[15]

Despite the vast literature on the benefits of diabetes control, Koro et al[9] (2004) showed, in North-American population-based inquiries, that there was an increase in the prevalence of diabetes and a decline in glycemic control in this population from 1988 to 2000. The high cumulative incidence of cognitive decline, physical decline and geriatric syndromes among

diabetic elderly people indicates the need to focus more intensely on public health measures that reduce the burden of this disease.

Arif et al[2] (2005) mention that asthma is common among the elderly and that female sex, low socioeconomic level, obesity, poor air quality and smoking are associated with its gravity. People who suffer from asthma rate their health status as medium or poor and state that their quality of life is compromised.

Studies show a protective effect of paid work or a risk effect for functional incapacity in the retired elderly when compared to those who continued working.[19,20] The maintenance of paid work may have a protective effect through social support mechanisms that are similar to those that explain the protective effect of the monthly relationship with friends. Interacting with other people provides fundamental cooperation relationships. The labor activity can also involve competition mechanisms that are, to a certain extent, beneficial, as they imply daily challenges that keep the worker active and help in the maintenance of functional capacity. Paid work is a hard executive function as it is supervised and there is a level of competence involved.

A multicentric study in Finland, Holland and Spain compared the prevalence, incidence and recovery of incapacity among community elderly individuals and showed that social bonds (familial and non-familial) protect against incapacity in aging.[25] In Belo Horizonte, Southeastern Brazil, monthly relationship with friends was found to have a protective association,[7] like in São Paulo.[19]

The majority of the cross-sectional studies that found an association between family and/or friendship relationship and functional capacity have questioned whether such relationships would be the causes or consequences of functional capacity. Given the longitudinal design of the present study, it is possible to state that the social support deriving from the monthly relationship with friends protects against functional loss, showing the importance of social and affective relations, especially friendship, for active aging.

Leisure activities, like watching TV, that denote interest in day-by-day life, and handcrafting, that demands ability and planning, may have a protective effect through mechanisms that are similar to the labor activity, except that they do not necessarily involve contact with other people. Possibly, these and other activities, such as those involving learning, have a protective effect by mechanisms that involve cognitive stimulation and compensatory mechanisms of the social support network, which occurs in most leisure activities. Again, social relations are identified as essential for the maintenance of functional capacity

Among the limitations of this study, we can mention errors in the classification of the outcome due to self-reported measure of functional capacity and losses in the cohort follow-up. The absence of significant differences between the interviewees and the follow-up losses according to sex, level of schooling, presence of paid work, self-rated health, or cognitive impairment suggests that they were random losses that did not affect the validity of the results.

To conclude, the prevention of functional loss should include the adequate control of chronic diseases, like hypertension, asthma and diabetes, and stimulus to cognitive activity. Social interaction protects the elderly from functional loss. Labor and leisure activities should be valued throughout life, especially in more advanced ages, as well as relationship with friends, with special attention to the social, cultural, biological and medicamental factors that hinder or impair the maintenance of these activities by the elderly.

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