



Morbidities and associations with self-rated health and functional capacity in the older people

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Abstract

Objectives: To investigate the relationship between diseases and self-rated health / functional capacity between gender and in different educational levels. **Methods:** A cross-sectional study was conducted with follow-up of 419 older adults who participated in the FIBRA Study, which investigated frailty in aged individuals. Socio-demographic variables, chronic non-communicable diseases, self-rated health and functional capacity were evaluated. Chi-square test or Fisher's exact test were used to test associations between the number of diseases and self-rated health and functional capacity, with the significance level set to 5%. **Results:** Negative self-rated health was significantly associated with the number of chronic diseases in the overall sample, among women and in both schooling categories. Having partial or total dependency on at least one or more instrumental activities of daily living (IADLs) showed a significant association for number of chronic diseases in the overall sample, among women and among individuals with 0 to four years of schooling. **Conclusion:** The chronic diseases seem to have a negative impact on self-rated health, especially in women and in relation to years of schooling, and they seem to have a functional disability in relation to instrumental activities of daily living, especially in women and the old people with 0 to 4 years of schooling.

Keywords: Activities of Daily Living. Health of the Elderly. Epidemiological Studies. Morbidity. Self-Assessment.

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INTRODUCTION

Approximately 80% of all deaths are attributed to chronic non-communicable diseases (CNCDs) in parts of southeast Asia and Latin America and the Caribbean, Mauritius and Seychelles, such as cardiovascular disease, respiratory disease, neoplasms and diabetes¹. According to Oliveira and colleagues on their study with ten years of follow-up, the major cause of death among the oldest people was circulatory diseases, which are CNCDs². Due to the aging of the population, there is an accumulation of chronic diseases that can be a predictor of negative self-rated health and functional disability³.

Individuals that can do their daily living activities independently and with autonomy have a good functional capacity. In other words, autonomy and independence are essential attributes for the functionality⁴. Independent functional status should be maintained as long as possible in life, as lower functional capacity is associated with greater rates of hospitalization, institutionalization and mortality⁵. The presence of chronic disease is one of the factors that have a negative impact on functional capacity and studies involving younger and older adults confirm the inverse association between these variables^{6,7}. A longitudinal study with old people above 80 years old revealed a negative association among chronic diseases and dependence on daily living activities, besides a higher risk of mortality⁷. Brito et al found statistically significant associations between the reduction in functional capacity and the occurrence of chronic diseases, physical inactivity and self-rated poor health among individuals older than 60⁸.

A negative self-perception of one's health is related to lower functional capacity. Self-rated health has been widely used as a health indicator since the 1950s⁹. In a study conducted in Brazil, the prevalence of poor self-rated health increased with age from 1.8% among 19-to-29-years-old people to 13.7% among those aged 70 years or more and the chance of poor self-rated health showed a fivefold increase greater among those with at least one CNCD¹⁰. However, when studying the oldest people (≥ 80 years), the individuals underestimated their self-rated health in relation their clinical conditions¹¹. Studies report that older population rate their health as good despite the

presence of chronic conditions¹². Subjective variables, such as resilience, can be forms to positive coping with the occurrence of chronic diseases¹³.

Subjective health and functional capacity are extremely important aspects of quality of life and the prevention of morbidity / mortality among the oldest old¹⁴. The self-rated health is an indicator of health and a measure of health inequalities. It is an important indicator of the relationship between health and disability based on socioeconomic inequalities. There are theories that try to explain the impact of population aging on health. In addition, it is necessary to take into account other factors such as gender and educational levels, and social stratum to understand the evolution of morbidity and its relationship with self-rated health and lower functional capacity. The aim of the present study was to investigate the relationship between diseases and self-rated health / functional capacity between gender and in different educational levels.

METHODS

A cross-sectional study was conducted with secondary data on older adults who participated in the *Fragilidade dos Idosos Brasileiros* (Frailty among Brazilian Older Adults - FIBRA Study), which investigated frailty in individuals aged 65 years or older who lived in seven Brazilian cities. In 2008 and 2009, 3,478 older adults were interviewed, 1,284 of whom lived in the city of Campinas (state of São Paulo, Brazil) and in the Ermelino Matarazzo District in the city of São Paulo, Brazil. In 2015, a follow-up study was designed with the older adults from Campinas and the Ermelino Matarazzo District who had participated in the 2008-2009 FIBRA study. Data collection took place in 2016 and 2017 and the final sample was composed of 419 participants. Figure 1 displays the number of older adults in each step of the study. The volunteers received information regarding the objectives of the study and signed an informed consent. The FIBRA study received approval from the Human Research Ethics Committee (CAAE 49987615.3.0000.5404 and 92684517.5.1001.5404). The present study received approval on December 11th, 2018 (certificate number: 3.071.453) and was also registered with Brazil Platform (C.A.A.E. 02184418.7.1001.5404).

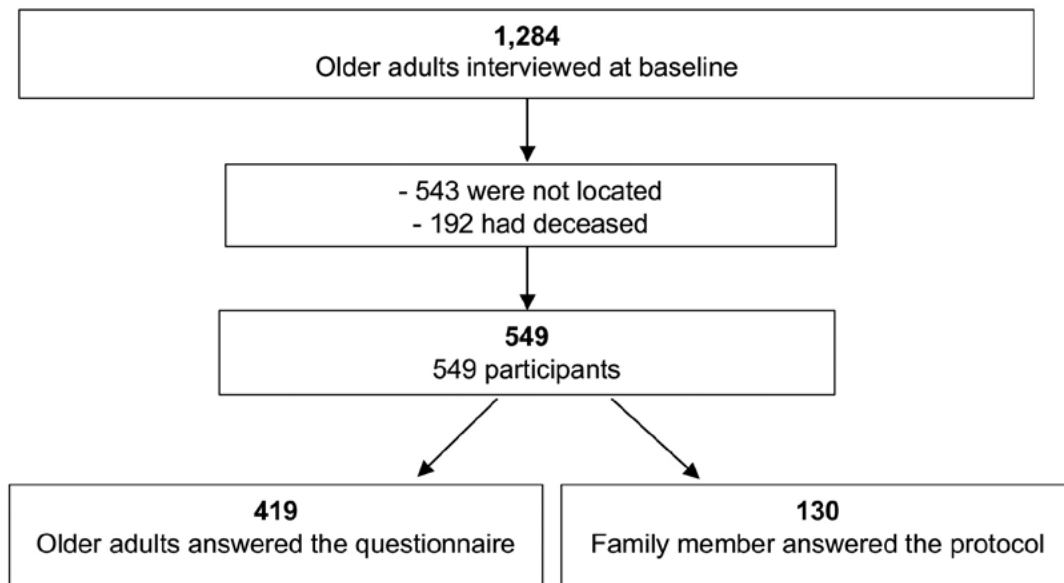


Figure 1. Flowchart of final sample. FIBRA Study 2016/17.

Older adults aged 70 years or older living in urban areas who had participated in the first wave of the 2008/2009 FIBRA Study¹⁵ between 2016 and 2017 were recruited. Visits were made by pairs of trained researchers and interviews were held in a single session lasting an average of 80 minutes.

Prior to the interview, the researchers explained the nature of the study and the procedures involved to the older adults and families. The volunteers agreed to participate by signing an informed consent. The following were the exclusion criteria: memory or spatial orientation or communication deficits suggestive of cognitive impairment; permanent or temporary inability to walk (the use of a gait-assistance device was accepted); localized loss of strength or aphasia due to a stroke; severe movement, speech or affectivity impairment associated with advanced Parkinson's disease; severe hearing or vision impairment; and being under terminal stage.

Four hundred nineteen individuals who agreed to participate and scored above the cutoff points established by Brucki on the Mini Mental State Examination according to schooling (17 for illiterate individuals and those with no formal schooling, 22 for those with one to four, 24 for those with five to

eight years and 26 for those with nine or more years of schooling)^{16,17} were included in the present study.

Socio-demographic characteristics: sex (female and male), age (80 to 84 years and 85 or older), schooling (0, 1 to 4 and 5 or more years of study) and income (categorized in quintiles of the observed distribution);

Chronic non-communicable diseases: nine dichotomous items addressing whether a physician had ever made a diagnosis of heart disease, systemic arterial hypertension, stroke (ischemic or hemorrhagic), diabetes mellitus, cancer, arthritis/rheumatism, depression, lung disease or osteoporosis. The number of diseases was then counted for each participant and dichotomized as none to one and two or more chronic diseases.

Self-rated health: determined based on the answer to the following question: *In general, would you say your health is very good, good, fair, poor or very poor?* For the analysis, the answers were grouped as good/very good and very poor/poor/fair.

Functional capacity: evaluated based on self-reports regarding the performance of instrumental activities of daily living (IADLs); those who reported

requiring partial or complete assistance for the execution of one or more IADLs were considered dependent. The activities in question were listed on the Lawton scale^{18,19}, such as: using the telephone, using transportation, shopping, food preparation, housekeeping, responsibility for their own medications and handling finances. The interviewee reported being completely independent, requiring some assistance or being complete dependent on the assistance of others for each of the activities on the list. Those who reported requiring partial or complete assistance to perform one or more IADL on the Lawton scale were considered dependent.

Descriptive analysis was performed for the characterization of the sample using absolute and relative frequencies. Percentage distributions and 95% confidence intervals were estimated. Associations between the number of chronic diseases and both self-rated health and functional capacity were tested using either the chi-square test or Fisher's exact test, with the significance level set to 5% ($p < 0.05$).

RESULTS

Four hundred nineteen older adults participated in the present study. Most participants were women (69.9%), were 80 years old or older (55.9%), with one to four years of schooling (58.2%), two or more chronic diseases (67.3%) and self-rated health as good/very good (53.0%). Independence regarding IADLs was found in over half of the sample (50.4%). The characterization of the sample is shown in Table 1.

Table 2 displays the prevalence of fair/poor/very poor self-rated health and dependence on IADLs. Negative self-rated health was significantly associated with schooling and multimorbidity, but it was not associated with sex, age and income. The report of dependence on at least one IADL was significantly associated with sex and multimorbidity, but it is not associated with the variables income, age and schooling.

Figure 2 shows the relation between the number of diseases and negative self-rated health in the overall sample (a), among men (b), among women (c), individuals with five or more years of schooling (d) and those who were illiterate or had up to four years of schooling (e). According to the results, individuals with more chronic diseases and female older adults showed negative self-rated health. The same association was found for both categories of schooling but it was not found for males.

Figure 3 illustrates the relation between the number of diseases and dependence on at least one IADL in the overall sample (a), among men (b), among women (c), among older adults with five or more years of schooling (d) and among those who were illiterate or had up to four years of schooling (e). The number of chronic diseases was associated with dependency in at least one IADL for the overall sample, female sex and individuals with 0 to four years of schooling. For the other variables, this association was not found. In other words, there is not a significant association among number of chronic diseases and functional dependency for men and older adults with five or more years of schooling.

Table 1. Characterization of the sample according to socio-demographic variables, morbidities, self-rated health and functional capacity. FIBRA Study. Brazil. 2016-2017.

Variables	N (%)	CI95%*
Sex		
Male	126 (30.1)	25.8-34.6
Female	293 (69.9)	65.3-74.1
Age		
70-79 years	184 (44.1)	39.4-48.9
80 years or more	233 (55.9)	51.0-60.6

to be continued

Continuation of Table 1

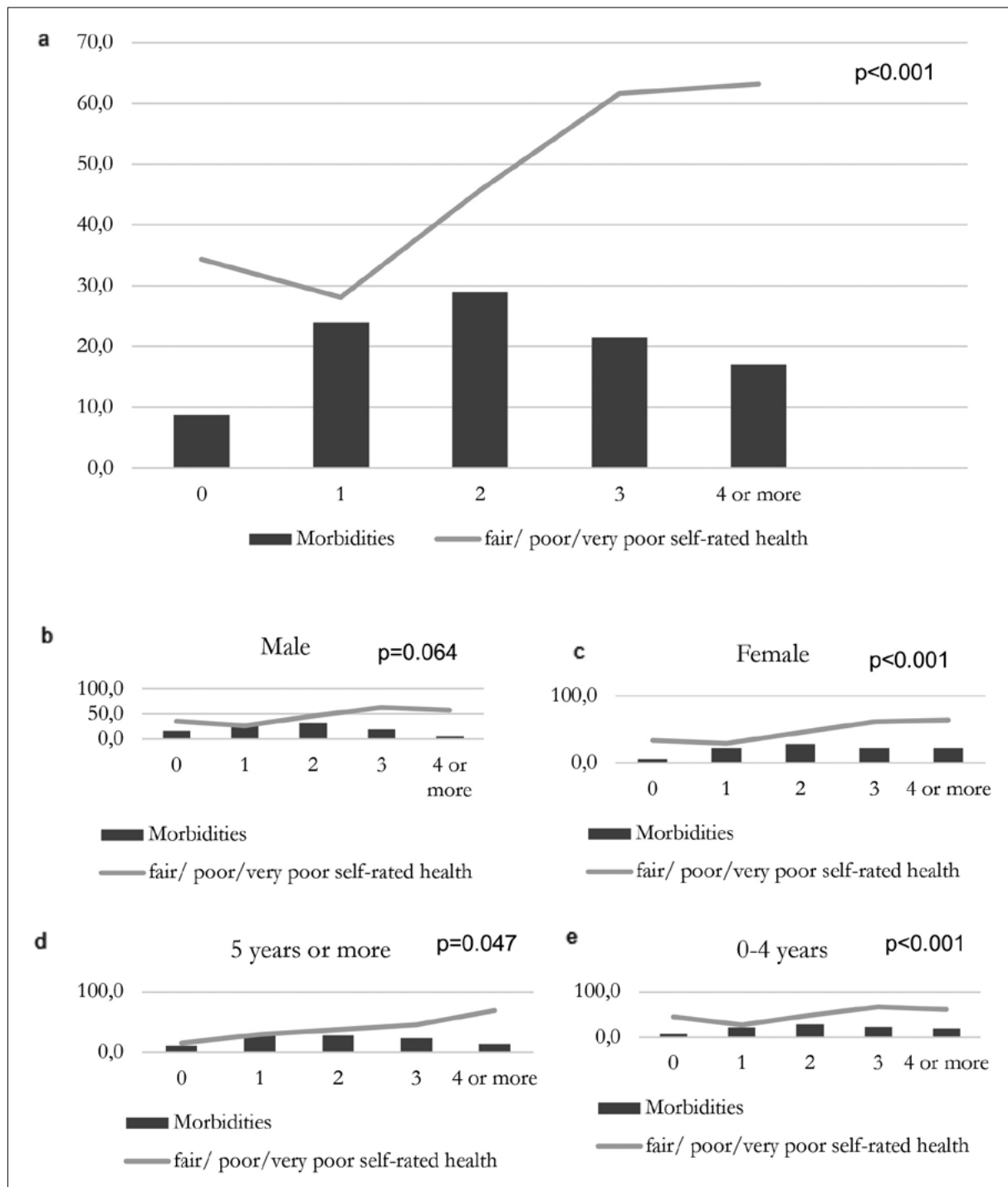
Variables	N (%)	CI95%*
Income		
1 st quintile	83 (22.3)	18.3-26.8
2 nd quintile	88 (23.7)	19.6-28.3
3 rd quintile	56 (15.0)	11.7-19.1
4 th quintile	75 (20.2)	16.4-24.6
5 th quintile	70 (18.8)	15.1-23.1
Schooling		
Illiterate	57 (13.6)	10.6-17.2
1-4 years	244 (58.2)	53.4-62.9
5 or more	118 (28.2)	24.0-32.7
Morbidity		
0-1	131 (32.7)	28.2-37.4
2 or more	270 (67.3)	62.6-71.8
Self-rated health		
Very good/good	222 (53.0)	48.2-57.7
Fair/poor/very poor	197 (47.0)	42.3-51.8
Functional capacity		
Independent IADLs**	211 (50.4)	45.6-55.1
Dependent IADLs**	208 (49.6)	44.8-54.4

* Confidence Interval; ** Instrumental activities of daily living.

Table 2. Prevalence of the fair/ poor/very poor self-rated health and dependent for instrumental activities of daily living. FIBRA Study. Brazil. 2016-2017.

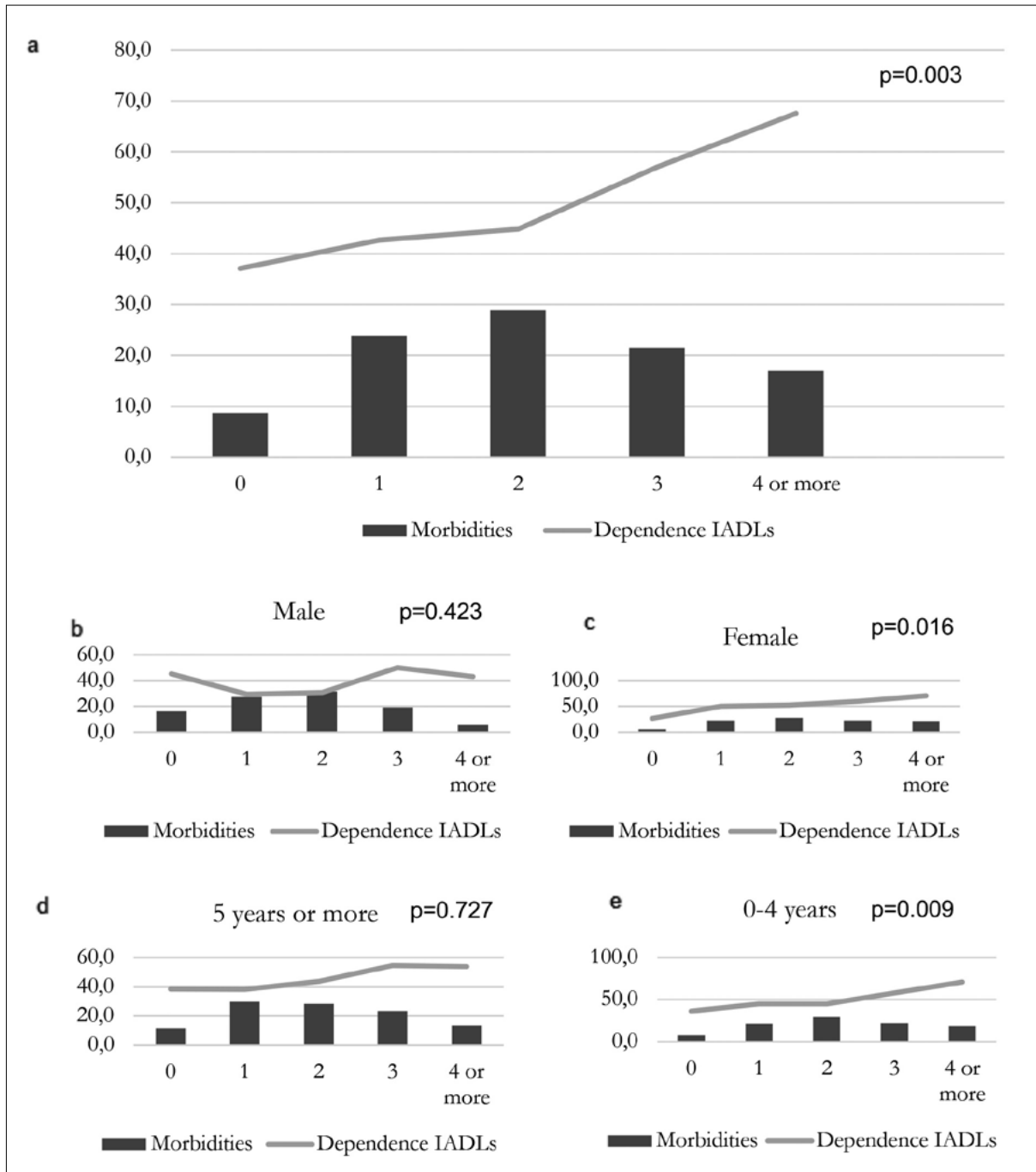
Variables	Fair/poor/very poor self-rated health		Dependent for IADLs*	
	Prevalence %	p-value	Prevalence %	p-value
Sex		0.183		< 0.001
Male	42.1		36.5	
Female	49.1		55.3	
Age		0.682	0.645	0.645
70-79 years	48.4		48.4	
80 years or more	46.3		50.6	
Income		0.254		0.087
1 st quintile	54.2		50.6	
2 nd quintile	47.7		44.3	
3 rd quintile	48.2		33.9	
4 th quintile	41.3		54.7	
5 th quintile	37.1		55.7	
Schooling		0.020		0.059
5 or more	39.0		44.1	
1-4 years	47.5		49.2	
Illiterate	61.4		63.2	
Morbidity		< 0.001		0.013
0-1	29.8		41.2	
2 or more	55.2		54.4	

* IADLs: Instrumental activities of daily living.



(a) Number of chronic diseases associated with self-rated health as fair/poor/very poor in overall sample; (b) Number of chronic diseases associated with self-rated health as fair/poor/very poor among males; (c) Number of chronic diseases associated with self-rated health as fair/poor/very poor among females; (d) Number of chronic diseases associated with self-rated health as fair/poor/very poor among five years or more of schooling; (e) Number of chronic diseases associated with self-rated health as fair/poor/very poor among illiterate to four years of schooling. FIBRA Study, Brazil, 2016-2017.

Figure 2. Number of chronic diseases associated with self-rated health as fair/poor/very poor for sex and schooling, FIBRA Study, Brazil, 2016-2017.



(a) Number of chronic diseases associated with having difficulty on at least one instrumental activity of daily living (IADL) in overall sample; (b) Number of chronic diseases associated with having difficulty on at least one IADL among males; (c) Number of chronic diseases associated with having difficulty on at least one IADL among females; (d) Number of chronic diseases associated with having difficulty on at least one IADL among five years or more of schooling; (e) Number of chronic diseases associated with having difficulty on at least one IADL among illiterate to four years of schooling. FIBRA Study, Brazil, 2016-2017.

Figure 3. Number of chronic diseases associated with having difficulty on at least one instrumental activity of daily living for sex and schooling, FIBRA Study, Brazil, 2016-2017.

DISCUSSION

In the present study, approximately 67.0% of the participants had two or more chronic diseases, 53.0% rated their health as good/very good and 50.4% did not require assistance regarding IADLs. A significant association was found between negative self-rated health and the number of chronic diseases in the overall sample, among women and in both schooling categories; and between number of chronic diseases and dependence on one IADL in the overall sample, among women and among individuals with 0 to four years of schooling.

The prevalence of two or more chronic diseases is in agreement with data described in the ELSI Study-Brazil involving 9,412 individuals aged 50 years or older, among whom the prevalence of multimorbidity was 67.8% for two or more diseases and 47.1% for three or more diseases²⁰. A longitudinal study with 9,061 participants with mean age of 61.7 years old showed that, along 23 years, one third of participants (33.7%) presented diagnosis of three or more chronic diseases and 25.9% presented the diagnosis of two diseases occurring simultaneously, corroborating our study's data²¹.

Regarding the prevalence of negative self-rated health, significant associations were found with schooling and multimorbidity. Feenstra and colleagues conducted a study with older adults (mean age: 69 years) and found that negative self-rated health was associated with a larger number of chronic diseases, as expected, and low schooling was also associated with the perception of having poor health²², as occurred in the present investigation. A low level of schooling is associated with poorer living conditions, inequalities in access to healthcare services and their use and low adherence to treatments, which may explain the higher prevalence of negative self-rated health in the subgroups of illiterate older adults and those with a greater number of chronic diseases.

In the analysis of the association between the number of chronic diseases and negative self-rated health according to sex and schooling, significant results were found in the overall sample, among women and in both schooling categories. Antunes et al conducted a study aimed at evaluating the

negative self-rated health among older adults living in communities in the city of São Paulo. In the study, the negative self-rated health was related with female sex and schooling, both in general evaluation and in the comparison²³. A study conducted in Ghana with 1,256 individuals aged 50 years or older found a difference between the sexes regarding self-rated health; the frequency of negative self-rated health being higher among women²⁴, which is in agreement with the present findings. It is noteworthy that in the aging process health is linked to the course of life and suffers the effects of different exposures throughout life.

Regarding the prevalence of disability on IADLs shown in Table 2, significant associations were found with multimorbidity and sex. A longitudinal study conducted in Portugal in 2016 involving 106 community-dwelling older adults revealed that those who were more dependent and those with multimorbidity at baseline underwent a significant reduction in functional capacity over a five-year period, demonstrating an association between chronic diseases and functional disability²⁵. In a study conducted by Filho, in 2018, the prevalence of difficulties for BADL and IADL was larger for women and older adults above 75 years old. Moreover, some specific illness was more related with functional dependency, according to the sex. This study confirms the association among female sex and decrease of functional capacity found in the present study²⁶. Similarly to the present study, Torres et al found the females older presented more dependency for BADL and IADL, besides other factors like advanced age, have been bedridden in the last two weeks, pain in the last month, lower educational level and restrictions to leave home²⁷. Indeed, older women have multimorbidity more than men, which lends further support to this association²⁸.

Regarding functional dependence and the number of chronic diseases, significant associations were found in the overall sample, the female sex and among individuals with zero to four years of schooling. Nunes et al conducted a study in 2017 involving 1,593 community-dwelling older adults (60 years of age or older) and found that 34.2% required assistance on IADLs. Such disability was related to an advanced age, widowhood, low schooling,

cognitive impairment and the use of healthcare service. Sex was not evaluated, but low schooling was associated with functional disability²⁹, as found in the present investigation. At the study conducted by Ćwirlej-Sozańska, with 498 oldest old people, the women showed higher level of dependence than men, besides a greater number of chronic diseases. Other variables were related with lower functional capacity, such as: advanced age, lower level of schooling and social activities, lack of social support, lack of good adaptation of external environment to their needs and higher number of chronic diseases³⁰. Such results reveal the multidimensionality of functional capacity and it can be thought that gender inequality in functional disability is mainly explained by the distribution of socioeconomic factors by gender and then health policy and programs aimed at reducing gender differences in socioeconomic resources might mitigate inequality.

Limitation is related to the survival bias; as long-lived individuals, the participants in this study had their diseases under control; otherwise, they would have been disabled or would have died. The participants were mostly women and with 0

to four years of schooling. Future studies should compare functional capacity in older people with different physical limitations and associate these limitations with measures of functional performance. Moreover, longitudinal studies should be conducted to determine risk factors for a poorer functional capacity and negative self-rated health.

CONCLUSION

In conclusion, the prevalence of negative self-rated health showed a significant association with schooling and multimorbidity, and the prevalence of disability on IADLs was significantly associated with multimorbidity and sex. Chronic diseases seem to have a negative impact on self-rated health, especially in women and in relation to years of schooling, and to have a functional disability in relation to instrumental activities of daily living, especially in women and the old people with 0 to 4 years of schooling. The results highlight the need to promote better living conditions to reduce social inequalities in health among the old people.

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