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Disability in instrumental activities of daily living among older adults: gender differences

Incapacidade em atividades instrumentais de vida diária em idosos: diferenças de gênero

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ABSTRACT

OBJECTIVE: To analyze gender differences in the incidence and determinants of disability regarding instrumental activities of daily living among older adults.

METHODS: The data were extracted from the *Saúde, Bem-Estar e Envelhecimento* (SABE – Health, Wellbeing and Ageing) study. In 2000, 1,034 older adults without difficulty in regarding instrumental activities of daily living were selected. The following characteristics were evaluated at the baseline: sociodemographic and behavioral variables, health status, falls, fractures, hospitalizations, depressive symptoms, cognition, strength, mobility, balance and perception of vision and hearing. Instrumental activities of daily living such as shopping and managing own money and medication, using transportation and using the telephone were reassessed in 2006, with incident cases of disability considered as the outcome.

RESULTS: The incidence density of disability in instrumental activities of daily living was 44.7/1,000 person/years for women and 25.2/1,000 person/years for men. The incidence rate ratio between women and men was 1.77 (95%CI 1.75;1.80). After controlling for socioeconomic status and clinical conditions, the incidence rate ratio was 1.81 (95%CI 1.77;1.84), demonstrating that women with chronic disease and greater social vulnerability have a greater incidence density of disability in instrumental activities of daily living. The following were determinants of the incidence of disability: age ≥ 80 and worse perception of hearing in both genders; stroke in men; and being aged 70 to 79 in women. Better cognitive performance was a protective factor in both genders and better balance was a protective factor in women.

CONCLUSIONS: The higher incidence density of disability in older women remained even after controlling for adverse social and clinical conditions. In addition to age, poorer cognitive performance and conditions that adversely affect communication disable both genders. Acute events, such as a stroke, disables elderly men more, whereas early deficits regarding balance disable women more.

DESCRIPTORS: Aged. Disabled Persons. Personal Autonomy. Activities of Daily Living. Gender and Health.

RESUMO

OBJETIVO: Analisar diferenças de gênero na incidência e determinantes de incapacidade em atividades instrumentais de vida diária em idosos.

MÉTODOS: Os dados são provenientes do Estudo Saúde, Bem-Estar e Envelhecimento. Em 2000, 1.034 idosos sem dificuldades nas atividades instrumentais de vida diária foram selecionados. As características verificadas na linha de base foram: sociodemográficas, comportamentais, estado de saúde, quedas e fraturas, internações, sintomas depressivos, cognição, força, mobilidade, equilíbrio e percepção de visão e audição. Atividades instrumentais, como fazer compras, cuidar do próprio dinheiro e da própria medicação, utilizar meios de transporte e telefone, foram reavaliadas em 2006 e os casos incidentes de incapacidade foram considerados como desfecho.

RESULTADOS: A densidade de incidência de incapacidade em atividades instrumentais de vida diária foi de 44,7/1.000 pessoas/ano para mulheres e 25,2/1.000 pessoas/ano para homens. A razão da densidade de incidência entre mulheres e homens foi 1,77 (IC95% 1,75;1,80). Após ajuste por condições socioeconômicas e clínicas, a razão da densidade de incidência foi 1,81 (IC95% 1,77;1,80), mostrando que mulheres com doenças crônicas e maior vulnerabilidade social apresentaram maior densidade de incidência de incapacidade em atividades instrumentais de vida diária. Foram determinantes da incidência de incapacidade: idade ≥ 80 anos e pior percepção de audição em ambos os sexos; acidente vascular encefálico entre homens e idade entre 70-79 anos entre mulheres. Melhor desempenho cognitivo foi fator protetor em ambos os sexos e melhor equilíbrio para mulheres.

CONCLUSÕES: A maior densidade de incidência de incapacidade em mulheres foi mantida mesmo após ajuste por condições clínicas e sociais adversas. Além da idade, o pior desempenho cognitivo e condições que adversamente afetam a comunicação incapacitam ambos os gêneros. Eventos agudos, como o acidente vascular cerebral, incapacitam mais os homens, enquanto déficit precoce no equilíbrio incapacita mais as mulheres.

DESCRITORES: Idoso. Pessoas com Deficiência. Autonomia Pessoal. Atividades Cotidianas. Gênero e Saúde.

INTRODUCTION

Instrumental activities of daily living (IADL) are fundamental to the relationship between older adults and their surroundings, allowing autonomy and independence to be maintained, as well as avoiding social isolation.[10] Cognitive deficit,[20] advanced age, sedentary lifestyle and poor lower limb function are risk factors for disability regarding IADL,[7] whereas a higher level of schooling,[7] living alone and consuming between 10 and 20 g of alcohol per day have been identified as protective factors.[5] However, it is important to emphasize that even low daily alcohol intake can evolve toward dependence and that negative associations are found when analyses are made without a competitive risk of death.

A higher incidence of disability is found in women, which has been attributed to their greater longevity, higher prevalence of non-fatal chronic conditions, constitutional factors (less muscle strength and lower bone density) and higher rates of lifestyle factors such as sedentary behavior and obesity.[16] The majority of the studies that report a higher incidence of disability in women have employed univariate analysis or with the control of only one or two factors, while no difference between genders has been found when the analysis is adjusted for socioeconomic status and health conditions.[21]

Data from Brazil show that the incidence density of disability in basic activities of daily living (BADL) is higher in women, even after adjusting for socioeconomic status and health conditions. Furthermore, gender differences have been found regarding risk factors, as decreased mobility/balance and health

conditions that affect the central nervous system or lead to impaired cognition disable more men than women, whereas women are more affected by sedentary lifestyle, reduction in muscle strength and conditions that affect the osteoarticular system.[1]

IADL involve more complex levels of physical functioning and neuropsychological organization than BADL. Furthermore, there is little conclusive evidence in either developed or developing countries that gender and sociocultural characteristics influence the incidence of disability in IADL or that risk factors differ between men and women.

The aim of this study was to analyze gender differences in the incidence and determinants of disability regarding instrumental activities of daily living among older adults.
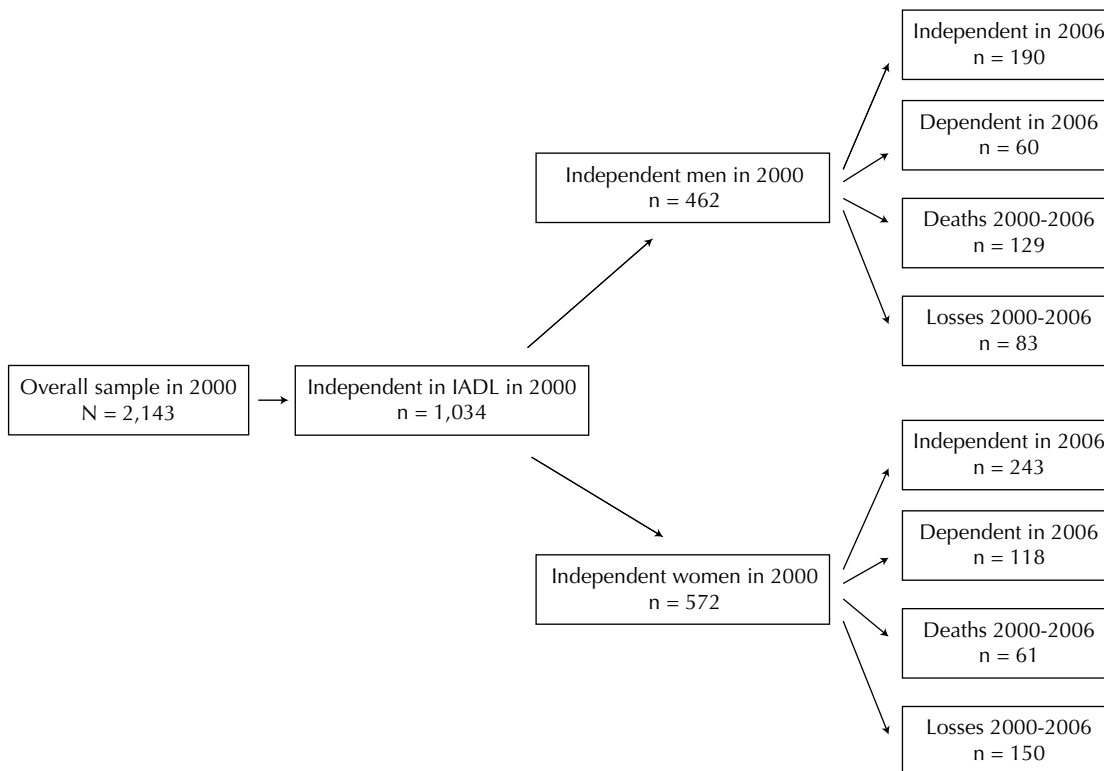
METHODS

A longitudinal study was carried out with baseline characteristics measured in the year 2000 and the outcome measured in 2006. Figure 1 displays the study design.

Data were extracted from the *Saúde, Bem-Estar e Envelhecimento* (SABE – Health, Wellbeing and Ageing) study, which involves a probabilistic sample represen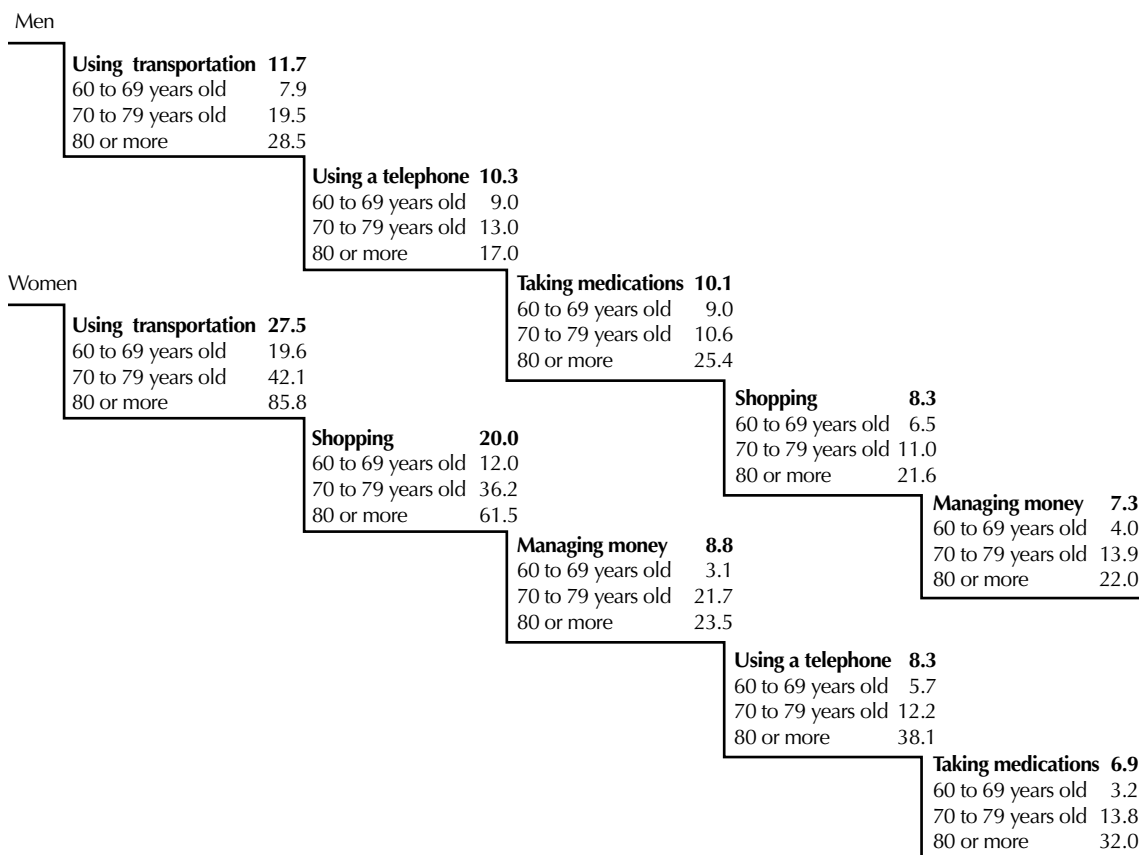tative of the urban population aged 60 and older in Sao Paulo, SP, Southeastern Brazil, composed of 2,143 individuals. At the baseline, the evaluation involved at-home interviews, anthropometric measures and physical performance tests. Detailed information on the study design, sampling, interviews, measures and performance tests has been published previously.[9,14] Of the 2,143 participants interviewed in 2000, the 1,034 who reported no disability on IADL made up the final sample.

The dependent variable was disability in instrumental activities of daily living. Respondents were asked if they had difficulty performing IADL (shopping, managing money, using transportation, using the telephone and taking medications), for which a modified version of the Lawton IADL scale was used.[14] Respondents who reported difficulty or inability performing one or more of tasks were recorded as having disability in IADL.[10] Despite their importance to functionality among older adults, activities such as preparing meals, house cleaning and washing clothes were removed from the present analysis due to the fact that such tasks have a strong cultural component with regard to gender and could therefore compromise the comparison of the incidence of disability between men and women.[14]

As for independent variables, the sociodemographic characteristics evaluated were gender, age, marital status, living arrangement [alone or accompanied] and schooling. Age was grouped into three 10-year categories,

Figure 1. Study design. Sao Paulo, SP, Southeastern Brazil, 2000-2006.

Men

Using transportation 11.7
60 to 69 years old   7.9
70 to 79 years old   19.5
80 or more   28.5

Using a telephone 10.3
60 to 69 years old   9.0
70 to 79 years old   13.0
80 or more   17.0

Women

Using transportation 27.5
60 to 69 years old   19.6
70 to 79 years old   42.1
80 or more   85.8

Taking medications 10.1
60 to 69 years old   9.0
70 to 79 years old   10.6
80 or more   25.4

Shopping   20.0
60 to 69 years old   12.0
70 to 79 years old   36.2
80 or more   61.5

Shopping   8.3
60 to 69 years old   6.5
70 to 79 years old 11.0
80 or more   21.6

Managing money   8.8
60 to 69 years old   3.1
70 to 79 years old   21.7
80 or more   23.5

Managing money   7.3
60 to 69 years old   4.0
70 to 79 years old   13.9
80 or more   22.0

Using a telephone   8.3
60 to 69 years old   5.7
70 to 79 years old   12.2
80 or more   38.1

Taking medications 6.9
60 to 69 years old   3.2
70 to 79 years old   13.8
80 or more   32.0

Figure 2. Incidence density of disability in instrumental activities of daily living per 1,000 person/years according to activity, gender and age group among older adults. Sao Paulo, Southeastern Brazil, 2000-2006.

with individuals aged 80 combined into a single group. Marital status was classified as with conjugal life (married or in a stable relationship) and without conjugal life (divorced, separated or widowed). Schooling (in years) was analyzed as a continuous variable.

The Social Vulnerability Index (SVI) was employed. Vulnerability is defined as the state of individuals or groups who, for some reason, have a diminished capacity for self-determination, which may present difficulties in protecting their own interests due to deficits of power, intelligence, education, resources, strength or other attributes.[6] Social vulnerability is one of three categories of vulnerability proposed by Ayres et al[4] (2006) and is characterized by cultural, social and economic aspects that can determine access to goods and services. The SVI is used to assess multiple dimensions of poverty using indicators such as income, schooling and family lifecycle, allowing areas with different degrees of vulnerability to be identified. The score ranges from 1 to 6 points, with 1 indicating a

lack of vulnerability and scores of 2 to 6 indicating increasing degrees of vulnerability.[a]

Smoking status was assessed by asking participants if they were non-smokers, former smokers or current smokers. Alcohol intake was assessed by asking participants if they were non-drinkers, drank once a week, drank two to six days a week or drank every day. Physical activity was evaluated and participants who reported doing physical activity at least three times a week over the previous 12 months were considered active.

Health status was assessed by self-reports of hypertension, diabetes, chronic lung disease, heart disease, stroke, osteoarthritis and total number of diseases for each individual. History of falls and fractures in the previous 12 months, history of hospitalizations in the previous four months and perceptions of hearing (good/poor)[9] as well as near and far vision (good/poor) were also analyzed. Cognitive status was evaluated using the modified version of the Mini Mental State Exam (MMSE) due to the low level of schooling of the Brazilian elderly population. This measure has 13

items that do not depend upon schooling, with a total possible score of 19 points.[13] The Brazilian version of the Geriatric Depression Scale was used to assess depressive symptoms.[19,22] Participants with score ≥ 6 were considered to have depressive symptoms (80.5% sensibility and 78.3% specificity).[2]

Handgrip strength (in kg) was assessed using a hand-held dynamometer (Takei Kiki Kogyio TK 1201). Grip size was adjusted to each participant. The test was performed twice on the dominant limb with a one-minute rest between tests and the higher value of the two trials was used for scoring. Grip strength was incorporated into the regression models in terciles (men: upper tercile > 39 kg; intermediate tercile ≥ 31 kg and ≤ 39 kg; and lower tercile < 31 kg; women: upper tercile > 24 kg; intermediate tercile ≥ 20 kg and ≤ 24 kg; and lower tercile < 20 kg). Body mass index (BMI) was calculated from weight and height measurements. The classification followed the recommendations of the Pan American Health Organization for older adults: BMI < 23 kg/m^2 = underweight; $\geq$ 23 and < 28 kg/m^2 = ideal weight range; $\geq$ 28 and < 30 kg/m^2 = overweight; and BMI $\geq$ 30 kg/m^2 = obesity.[b]

Performance (in seconds) on the sit-and-stand test (sitting down on and standing up from a chair five times) from the Short Physical Performance Battery was assessed.[12] Balance was evaluated based on the performance (in seconds) on the one-leg balance test, which was defined as the ability to stand on one leg unsupported for ten seconds.[25]

As the statistical analysis of incidence density is a measure of the occurrence of events among person-years of observation and the analysis of determinants is a measure of the occurrence of probabilities, such analyses were performed separately by gender. To compute the incidence density, the numerator was the number of new cases of disability in at least one IADL between 2000 and 2006 and the denominator was the number of persons-time exposed to the risk of developing disability in the same period and population. For those who had died, the period of observation was the interval between the date of the interview held in 2000 and the date of death. For deaths of unknown date, the period of observation was the interval between the date of the interview in 2000 and a date attributed to the death determined by the mean date of death of the known cases in the same age group and gender. For those who had not developed disability, the period of observation was the interval between the interviews in 2000 and 2006. For those who developed it, the period of observation was half the period between the interviews in 2000 and 2006. Individuals lost to follow up (those who were not located, had moved away from the city, were institutionalized or refused to participate) were excluded from the incidence density analysis.

Of the 1,034 individuals interviewed in 2000, 611 (59.1%) were interviewed and reassessed in 2006 with regard to anthropometric and physical performance, 190 (18.4%) had died and 233 (22.5%) were either not located, had moved to another city, had been institutionalized or refused to participate (Figure 1).

The incidence density according to gender was controlled for socioeconomic status, as measured by the SVI (≤ 1 = without social vulnerability; > 1 = with social vulnerability), and chronic diseases (without disease *versus* one or more diseases). Incidence rate ratios (IRR) were computed to determine gender differences in the occurrence of disability. For the analysis of determinants, the outcome was the presence/absence of disability in IADL in 2006. Poisson regression analysis was performed considering the weight of the sample. Associations with a p-value ≤ 0.2 in the univariate analysis were selected for the multiple regression analysis, for which the forward stepwise method was used. Differences in the characteristics of the interviewees, those who had died and those lost to follow up were analyzed using the Wald test and Rao-Scott test, considering the weight of the sample. The Stata 11® program was used for all data analyses.

All participants signed an informed consent form and the SABE study received approval from the local Human Research Ethics Committee (*Comissão Nacional de Ética em Pesquisa, Conselho Nacional de Saúde, Ministério da Saúde*) – Process 25000.024350/99-80 approved in 17/6/1999.

RESULTS

At baseline, most individuals with a conjugal life and accompanied living situation were men. Men also had higher SVI scores, greater grip strength, consumed more alcohol, smoked more and reported a worse perception of hearing. Women had a greater proportion of osteoarthritis, falls, depression, obesity, mean number of diseases and a poorer perception of seeing far (Table 1).

Comparing the baseline characteristics of both genders between those interviewed in 2006 and those who had died, the latter group was older and performed more poorly on the one-leg balance test (p ≤ 0.05). Men who had died smoked more, had a greater number of chronic diseases and reported more osteoarthritis (p ≤ 0.05). Women who died had lesser grip strength, a worse performance on the sit-and-stand test, reported more cardiovascular conditions and lived alone more frequently (p ≤ 0.05). In the comparison of the characteristics of those interviewed in 2006 and those lost to follow up, the women interviewed had a lower level of schooling, higher SVI scores and performed the sit-and-stand test

[b] Organización Panamericana de la Salud. Guía clínica para atención primaria a las personas adultas mayores. Santiago; 2003.

Table 1. Characteristics of older adults according to gender at baseline and according to functional status at follow up. Sao Paulo, SP, Southeastern Brazil, 2000-2006.

Variable	Baseline (2000)				Follow up (2006)							
	Men (n = 462)		Women (n = 572)		Men (n = 190)		Men (n = 60)		Women (n = 243)		Women (n = 118)	
	Means and %	SD	Means and %	SD	Independent means and %	SD	Dependent means and %	SD	Independent means and %	SD	Dependent means and %	SD
Sociodemographic												
Age (years) (mean)	67.4[a]	0.3	67.3	0.2	72.3[b]	0.4	75.1[b]	1.1	71.7[b]	0.3	75.5[b]	0.7
Marital status (with conjugal life)	82.7[a]		45.6[a]		81.6		85.7		39.7		34.7	
Social Vulnerability Index (mean)	2.6[a]	0.1	2.3[a]	0.1	2.6	0.1	2.9	0.3	2.4	0.1	2.4	0.1
Accompanied living condition (yes)	93.1[a]		80.9[a]		91.3		91.2		79.2		82.0	
Schooling (years) (mean)	7.5	2.1	4.7	0.2	5.7[b]	0.6	4.1[b]	0.7	4.6	0.4	4.1	0.5
Behavioral												
Smoking												
Non-smokers	27.5[a]		70.6[a]		29.7		29.4		76.0[b]		61.9[b]	
Former smokers	49.0[a]		18.5[a]		56.3		58.4		15.1[b]		32.3[b]	
Current smokers	23.5[a]		10.9[a]		14.0		12.2		8.9[b]		5.8[b]	
Weekly alcohol intake												
Non-drinkers	47.1[a]		71.7[a]		47.9[b]		78.4[b]		75.7		84.6	
Drank once a week	25.5[a]		22.9		23.9[b]		4.1[b]		17.1		12.5	
Drank two to six days a week	13.2[a]		3.3[a]		13.6[b]		8.7[b]		5.9		2.9	
Drank every day	14.2[a]		2.1[a]		14.6[b]		8.8[b]		1.3		–	
Practice of physical activity (active)	34.9		35.3		–		–		–		–	
Health status												
Hypertension (yes)	48.5		51.6		62.1		67.8		60.1[b]		74.1[b]	
Diabetes (yes)	17.6		16.1		17.0[b]		34.9[b]		19.4		10.7	
Chronic lung disease (yes)	11.3		10.5		12.1		14.1		10.0		11.9	
Heart disease (yes)	18.1		14.6		24.7		33.1		17.1[b]		29.6[b]	
Stroke (yes)	4.2		3.0		5.8[b]		35.2[b]		2.9[b]		11.8[b]	

Continue

Continuation

Osteoarthritis (yes)	19.3[a]	0.1	39.3[a]	25.8[b]	0.1	12.3[b]	0.1	41.4[b]	59.8[b]	0.1
Number of diseases (mean)	1.18[a]	0.1	1.34[a]	1.5[b]	0.2	1.9[b]	0.1	1.5[b]	2.0[b]	0.1
Falls in previous 12 months (yes)	19.0[a]		31.1[a]	19.4		32.0		31.1	40.0	
Hospitalization in previous 4 months (yes)	5.3		3.2	9.7		15.8		4.5[b]	16.0[b]	
Fracture in previous 12 months (yes)	1.0		1.5	1.3[b]		8.9[b]		3.4	3.1	
Score on Mini Mental State Exam (mean)	16.8	0.2	17.1	16.9[b]	0.2	13.2[b]	0.7	17.3[b]	14.9[b]	0.4
Geriatric Depression Scale (≥ 6 points)	8.6[a]		16.2[a]	6.0		13.1		8.4[b]	23.6[b]	
Perception of hearing										
Good	72.5[a]		79.1[a]	68.6		54.0		82.9	78.7	
Poor	27.5[a]		20.9[a]	31.4		46.0		17.1	21.3	
Perception of close vision										
Good	16.8		14.4	74.8		62.2		79.7[b]	64.9[b]	
Poor	83.2		85.6	25.2		15.4		20.3[b]	35.1[b]	
Perception of far vision										
Good	50.6[a]		42.2[a]	68.7[b]		40.6[b]		73.7[b]	60.0[b]	
Poor	49.4[a]		57.8[a]	31.3[b]		59.4[b]		26.3[b]	40.0[b]	
Hand grip strength (mean)	34.6[a]	0.2	21.8[a]	33.3[b]	0.7	26.3[b]	1.3	20.1[b]	17.8[b]	0.4
Body mass index										
Ideal	53.8[a]		44.0[a]	55.0		44.7		48.1	42.3	
Underweight	20.2[a]		15.7[a]	23.1		28.5		20.0	15.7	
Overweight	14.5[a]		12.2[a]	13.0		11.9		11.1	13.8	
Obesity	11.5[a]		28.1[a]	8.9		14.9		20.8	28.2	
Sit-and-stand test (seconds) (mean)	11.8[a]	0.2	13.2[a]	14.4	0.4	16.3	0.9	15.1[b]	16.7[b]	0.6
One-Leg Standing Balance (seconds) (mean)	8.8	0.1	8.6	8.4	0.2	7.1	0.7	8.2[b]	6.9[b]	0.5

Practice of physical activity was not measured in the same way at follow up, which does not allow for comparison.

[a] p ≤ 0.05, Wald test for comparison of means; Rao-Scott test for comparison of proportions between genders at baseline.

[b] p ≤ 0.05, Wald test for comparison of means; Rao-Scott test for comparison of proportions between independent and dependent individuals by gender at follow up.

more quickly (p ≤ 0.05). Male respondents reported more cardiovascular diseases (data not shown).

The unadjusted incidence density for disability regarding IADL was 35.6/1,000 person/years (95%CI 30.2;42.4) for both genders, 44.7/1,000 person/years (95%CI 36.7;54.8) for women and 25.2/1,000 person/years (95%CI 18.5;35.1) for men. The IRR was 1.77 (95%CI 1.75;1.80). After adjusting for socioeconomic status and health conditions, women with chronic diseases and social vulnerability continued to have a greater incidence of disability (IRR = 1.81; 95%CI 1.77;1.84) (Table 2).

The incidence of disability on IADL per 1,000 person/years by activity, gender and age group in the period of 2000 to 2006 is shown in Figure 2. For all activities, the incidence of disability increased progressively with age.

Comparing those who remained independent and those who became dependent among the 611 older individuals re-interviewed and reevaluated in 2006, those who became dependent were older, had a greater mean number of diseases, lower mean MMSE score, had more cases of stroke, lesser mean grip strength and a poorer perception of seeing far. Women who became dependent were mostly former smokers, had greater frequencies of hypertension, cardiovascular disease, osteoarthritis, depression, a poorer perception of seeing close, worse performance on the sit-and-stand test, worse performance on the one-leg balance test and a greater number of hospitalizations in the previous four months (Table 1). Men who became dependent had less schooling, consumed less alcohol, had more cases of diabetes, fewer cases of osteoarthritis and reported more fractures in the previous 12 months.

In both genders, being 80 years old or more and having a poorer perception of hearing were risk factors for disability regarding the performance of IADL, whereas a better MMSE score had a protective effect. For men, the report of a stroke was a risk factor for disability. For women, besides the age of 80 and older, the age group from 70 to 79 also exhibited greater risk, showing a dose-response effect of age on the mechanism of disability regarding the performance of IADL. A better performance on the one-leg balance test was considered a protective factor for this outcome (Table 3).

DISCUSSION

The present study demonstrated that women have a greater incidence of disability in IADL than men and this difference is maintained even after controlling for social vulnerability and the presence of chronic diseases. Besides age, poorer cognitive performance and conditions that adversely affect communication disable both genders. A history of acute events, such as a stroke, disables more men, whereas early-onset balance deficit disables more women. For both genders, the incidence of disability in IDAL was greater regarding the use of public transportation, with gender differences evidenced among the other activities evaluated. For women, the second greatest incidence of disability concerned shopping. Both using public transportation and shopping depend on adequate mobility. In the present study, mobility in the model for women was affected by balance and controlled for the presence of osteoarthritis and muscle strength. Anthropological and social factors in Brazil may also explain the gender differences. The majority of women had never had paid

Table 2. Incidence density on one or more instrumental activities of daily living according to gender, unadjusted and adjusted for social vulnerability and chronic diseases in older adults. Sao Paulo, SP, Southeastern Brazil, 2000-2006.

Variable	Incidence density (%)			Incidence Rate Ratio			
	Men	95%CI	Women	95%CI	Women/Men	95%CI	
Unadjusted	25.2	18.5;35.1	44.7	36.7;54.8	1.77	1.75;1.80	
Adjusted for social vulnerability (SVI > 1)							
Without vulnerability	6.6	0.9;148.5	39.2	25.9;62.2	5.91	5.46;6.41	
With vulnerability	25.2	18.9;34.3	38.9	32.3;47.4	1.55	1.52;1.57	
Adjusted for chronic diseases[a]							
Without disease	25.5	15.3;45.9	25.1	15.9;42.0	0.98	0.95;1.01	
One or more diseases	22.3	15.9;32.5	43.6	36.4;52.8	1.95	1.92;1.99	
Adjusted for social vulnerability and chronic diseases							
Without vulnerability and without disease	[b]	[b]	[b]	[b]	[b]	[b]	
Without vulnerability and with one or more diseases	[b]	[b]	47.7	32.0;74.3	[b]	[b]	
With vulnerability and without disease	29.1	17.4;52.6	28.5	18.2;47.3	0.98	0.95;1.01	
With vulnerability and with one or more diseases	23.6	16.7;34.6	42.7	34.8;52.9	1.81	1.77;1.84	

SVI: social vulnerability index
[a] Chronic diseases analyzed: systemic arterial hypertension, diabetes, chronic lung disease, heart disease, stroke and osteoarthritis.
[b] Cells with less than two incident cases.

Table 3. Determinants of disability in instrumental activities of daily living in older adults according to gender. Sao Paulo, SP, Southeastern Brazil, 2000-2006.

Variable	Unadjusted IRR	Adjusted IRR	95%CI (adjusted IRR)	p
Men (n = 250)				
Age (years)				
60 to 69	1	1		
70 to 79	1.43	1.52	0.82;2.78	0.174
80 or more	3.97	3.24	1.73;6.08	0.000
Perception of hearing				
Good	1	1		
Poor	2.03	1.99	1.10;3.59	0.023
Stroke				
No	1	1		
Yes	2.53	3.33	1.32;8.38	0.011
Mini Mental State Exam	0.93	0.91	0.86;0.97	0.003
Women (n = 361)				
Age (years)				
60 to 69	1	1		
70 to 79	2.15	1.92	1.29;2.87	0.001
80 or more	2.76	2.02	1.04;3.89	0.035
Osteoarthritis				
No	1	1		
Yes	1.37	1.08	0.72;1.63	0.699
Hand grip strength				
1st tercile	1	1		
2nd tercile	1.50	1.10	0.62;1.95	0.749
3th tercile	2.32	1.69	0.95;3.02	0.073
Perception of hearing				
Good	1	1		
Poor	1.79	1.68	1.09;2.58	0.018
Mini Mental State Exam	0.94	0.95	0.90;0.99	0.018
One leg balance	0.89	0.92	0.87;0.97	0.005

IRR: incidence relative risk

employment, depended on their husbands to manage the finances and were more responsible for household activities (which were not analyzed in this study) and caring for other members of the family. However, the activities practiced more by each gender may be precisely those in which disability occurs at a later time, especially with regard to IADL.

A poorer perception of hearing was a risk factor for the development of disability in IADL in both genders. Hearing impairment increases progressively with age and is associated with exposure factors throughout life and presbycusis. Presbycusis is characterized as a reduction in hearing and the understanding of speech in noisy environments, slowness in the central processing of acoustic information and a deficiency in locating the sources of sounds.[8] Activities such as shopping and using public transportation are performed in noisy environments that hamper the communication of older adults with others around them and consequently lead to difficulty in performing such tasks. The use of a telephone depends exclusively on hearing, with no possibility of relying on facial cues or other compensatory mechanisms, and is therefore affected by hearing impairment, which consequently has an adverse effect on older adults' understanding and communication.[9] Another issue widely discussed in the literature and evidenced in the present study is the difference between genders regarding hearing impairment. Greater hearing loss in men occurs due to working in noisy environments or at unhealthier jobs throughout life. Moreover, there are hormonal and metabolic differences that impair hearing more in the male gender.[18]

There is evidence that subtle changes in the performance of IADL, which make greater demands on cognitive skills, precede conditions of dementia. Thus, a better performance on the MMSE may be considered a protective factor regarding the onset of disability, as it theoretically represents the preservation of both long-term and short-term memory, the ability to perform calculations, preserved executive function and semantic knowledge, all of which are necessary to IADL.[20]

The occurrence of a stroke, which is an acute event, was a determinant of disability regarding IADL in men. At baseline, men having suffered a stroke did not report any difficulty in the performance of such activities, which may indicate that the development of disability was due to a possible aggravation of cases or even new events in the follow-up period. The same finding has also been reported as an important determinant of disability regarding BADL exclusively in the male gender.[1]

Cross-sectional studies have found associations between difficulty in IADL and a poorer performance on the one-leg balance test as well as lesser grip strength.[11,24] Moreover, longitudinal studies with a short follow-up period have identified the performance on the one-leg balance test as a predictor of disability in these activities.[17] However, it has not been previously demonstrated in longitudinal studies with a long follow-up period that the performance on the one-leg balance test is a determinant of disability in IADL exclusively in the female gender, as found in the present study.

The one-leg balance test is a balance assessment tool that requires the mechanism of postural control to activate the musculature of the hip and ankle to ensure anteroposterior and mediolateral stability. Greater oscillations from the center of pressure are seen in older adults. Men adopt balance strategies that involve the activation of more proximal groups to ensure greater stability, whereas women have a tendency to activate more distal groups, which are often incapable of ensuring postural stability.[23] To some extent, these alterations and inabilities are not evidenced by clinical instruments that assess balance on stable surfaces with the individual maintaining balance in a bipedal stance. Thus, the difference between genders is only evidenced using the one-leg balance test. This test may therefore be an important assessment tool for the clinical detection of balance disorders that have an impact on the incidence of disability regarding more complex activities that require greater control of the postural control mechanism.

Divergences in the follow-up period, age of the population analyzed, definitions of disability and the number of interviews in different studies hinder the comparison of results on the incidence of disability regarding IADL.[21] Another complication regards the calculation method. Although studies may describe losses to follow up, many do not report incidence density.

The present study has limitations that should be addressed. The data were from self-reports. Although this may be a source of bias, methodological studies have shown that self-reported data have satisfactory validity and are consistent with medical diagnoses and/or the results of physical tests.[26] Another limitation resides in the fact that the first wave of the SABE study was focused on the population of community-dwelling older adults and did not include residents of long-stay institutions. Thus, the estimates may have some degree of bias, as institutionalized older adults may have a greater prevalence rate of disability.[3] However, the institutionalized population in Brazil is relatively small, which minimizes such a bias.[c]

The missing data from the second wave of the study could also be considered an important limitation, but the differences in the characteristics at baseline were only significant for schooling, SVI and time required to perform the sit-and-stand test among the women and heart disease among the men. Thus, this may be considered random loss. Losses to follow up also led to broader confidence intervals in the estimates of incidence density when stratification was necessary to demonstrate differences between genders and in the analysis of determinants. However, it should be stressed that the sample size had the power to detect these associations even with these losses.

Another limitation regards the lack of information in the follow-up period on new events or complications in cases of stroke, which could have contributed to the understanding of the mechanism of determination for this risk factor.

The planning of effective preventive and rehabilitation strategies for reducing disability among older adults should be based on the fact that there are differences in the determinants of disability between genders. Besides a poorer cognitive performance and conditions that have an adverse effect on communication, which were considered risk factors for both genders, a history of acute conditions, such as a stroke, disables more men, whereas early-onset balance deficit disables more women in the long term. Moreover, women with chronic disease and social vulnerability should be the main target of these strategies.

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[c] Camarano AA, Watanabe HAW, Andrade A, Carvalho DF, Diniz H, Mello JL, et al. Relatório do projeto instituições de longa permanência para idosos – ILPI no Brasil: tipologia e proposta de modelo básico de assistência multidimensional 2009. Processo 555079/2006-6. Edital MCT-CNPq/MS-SCTIE-DECIT, n. 17/2006. Rio de Janeiro: Instituto de Pesquisa Econômica Aplicada; 2009.

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