Gender and incidence of functional disability in the elderly: a systematic review

Gênero e incidência de incapacidade funcional em idosos: revisão sistemática

Maria Aparecida Pinheiro Rodrigues [1]
Luiz Augusto Facchini [1]
Elaine Thumé [1]
Fátima Maia [1]

Correspondence
M. A. P. Rodrigues
Programa de Pós-graduação em Epidemiologia, Universidade Federal de Pelotas.
Rua Marechal Deodoro 1160, 3º andar, Pelotas, RS 96020-220, Brasil.
rodriguesmapa@terra.com.br

Abstract

This systematic review aimed to assess the effect of gender on the incidence of functional disability in the elderly. The search for publications in the MEDLINE, EMBASE, and ProQuest electronic databases from January 1990 to March 2008 identified 879 publications, from which 21 cohort studies were selected that evaluated gender as an independent variable and incidence of functional disability in elderly as the outcome. Review of the studies found that after adjusting for socioeconomic, health, and social relations indicators, incidence of functional disability was similar between genders. The main risk factors for functional disability in the elderly, regardless of gender, were: lack of schooling, living in rental housing, chronic diseases, arthritis, diabetes, visual impairment, body mass index above 25, poor self-perceived health, cognitive impairment, depression, slow gait, sedentary lifestyle, tiredness while performing daily activities, and limited diversity in social relations.

Disabled Health; Frail Elderly; Gender and Health

Introduction

Functional disability is an important health indicator in the elderly, jeopardizing quality of life and causing heavy social impact with long-term institutionalization and increased use of medical care [1].

To reduce functional disability – a major challenge for public health – requires knowledge of the risk factors involved in the process loss of autonomy by the elderly in order to allow efficient preventive strategies. In this context, it is necessary to determine the role of gender in the incidence of functional disability in the elderly, in order to establish preventive measures, and the healthcare supply needs to be adjusted for men and women.

The higher prevalence of functional disability in women has been attributed mainly to greater female longevity [2,3], but a study that replaced female mortality rates with male mortality rates observed a greater impact in the survival difference than in the difference between the genders in prevalence of functional disability [4], suggesting the possibility of higher incidence of functional disability among elderly women as compared to men. Meanwhile, research on the incidence of functional disability in elderly men and women has shown conflicting results, with some studies indicating higher incidence in women [4,5], others in men [6], and still others with no difference between the genders [7,8,9].

The aim of this systematic review was to verify whether functional disability risk factors and incidence vary according to gender in the elderly, to help ensure adequate planning of public policies for the prevention of functional limitations and organization of health services.

Methods

Definition of functional disability

The definition of disability encompasses various aspects. Illness, impairment, limitation, and handicap are terms that are directly associated with the concept of disability. Functional disability in the elderly is defined as an acquired difficulty in performing basic everyday tasks or more complex tasks needed for independent living [10]. Performance in functional disability includes three dimensions: physical, emotional, and mental [11]. Physical performance relates to the body's sensory and motor function, and is evaluated through activities like walking, crouching, and running. Emotional performance is measured through the individuals' adaptation to various events in their lives. Mental performance is evaluated through tests that measure the individuals' intellectual and rational capacity. The current review study covered only the physical dimension of functional disability.

Some theoretical models have been developed with the aim of explaining these concepts, facilitating knowledge, and understanding the terms used and backing their applicability in research, public policies, and clinical practice [8,12,13]. The model adopted by the World Health Organization (WHO) in 2001 combines a biological, individual, and social perspective, establishing a standardized language to describe functional status according to the individual's health conditions. According to this definition, functionality encompasses all body functions, tasks, or actions, and disability includes impairment, limited capacity, or restricted performance of activities [12,13].

The most widely used measurements of functional disability in the literature are those that assess basic activities of daily living, instrumental activities of daily living, and mobility. These indicators can be evaluated by means of the degree of difficulty (no difficulty, little difficulty, great difficulty, incapable of performing the task or activity) and/or dependence (need for help from others or inability to perform a task). The most frequently used indicator for measuring basic activities of daily living is the scale developed by Katz & Akpom [14], according to which the elderly lose the capacity to perform tasks in the inverse order that they acquire them in childhood. Basic activities of daily living include self-care tasks, which in the most famous version includes six items: bathing, getting dressed, going to the bathroom, getting from bed to a chair and vice-versa, maintaining sphincter continence, and eating. Instrumental activities of daily living are more adaptive tasks, necessary for independent living in the community, whose most widely used scale is that developed by Lawton & Brody [15], with eight items: using the telephone, shopping, cooking one's own meals, housecleaning, laundry, using transportation, taking medication, and managing finances. The evaluation of mobility refers to tasks related to the individual's locomotor system and that are measured through various instruments. The selected studies used the following instruments, although partially: Rosow-Breslau [16] (three items: walking 800m; climbing stairs; and performing heavy work around the home), Nagi [11] (five items: stooping, crouching, or kneeling; pulling or pushing an object like an armchair; raising one's arms above the shoulders; writing or holding small objects; and carrying more than 5kg), *Mobility-Help Scale* [17] (six items: need for help to get from bed to a chair; walking inside the home; going out; walking on the street in good weather; walking on the street in bad weather; and climbing stairs). There are also instruments that combine various items from basic activities of daily living, instrumental activities of daily living, and mobility: the *Stanford Health Assessment Questionnaire* [18], which measures functional disability through 20 items subdivided into eight categories (getting dressed; getting up; eating; walking; personal hygiene; reaching objects; grasping objects; and mobility outside the home) and the instrument of the Office for National Statistics [19], from the United Kingdom, which measures functional disability through 13 items (locomotion; flexibility; dexterity; grooming; sight; hearing; continence; communication; awareness; behavior; intellectual function; digestion; and overall status).

Sources

The published studies were identified through the MEDLINE/PubMed, EMBASE, and ProQuest databases from January 1990 to March 2008. The terms used were "*elderly*", "*aged*", "*older ones*", "*disability*", "*impairment*", "*decline*", or "*limitation*" combined with "*functional*" and "*longitudinal studies*" for defining the outcome. The modifiers used were "*risk*", "*gender differences*", "*activities of daily living*", and "*health status*". The references from articles included in this study were reviewed. Review studies, unpublished articles, abstracts, theses, dissertations,

and book chapters were not included. The review only included studies in English, Spanish, or Portuguese.

Study selection

The review included cohort studies published from January 1990 to March 2008, performed in individuals 55 years or older, living in the community, where the outcome was incidence of functional disability and in which gender was evaluated as an independent variable or the analyses were stratified by gender. Figure 1 summarizes the exclusion process for the retrieved studies. Of the 879 initially identified studies,

78 were excluded because they failed to present original results. Next, 232 studies were excluded because the measures of disability failed to meet the current review's criteria. Another 182 studies were then excluded because the samples consisted partially or totally of institutionalized elderly. Lack of quantitative data analysis was cause for exclusion of 104 studies. Next, 236 cross-sectional studies were excluded. Finally, 26 studies were excluded that only evaluated changes in the degree of functional disability as the outcome, leaving 21 studies that analyzed incidence of functional disability in elderly who did not present functional limitations at the start of follow-up.

Figure 1

Diagram of study selection.
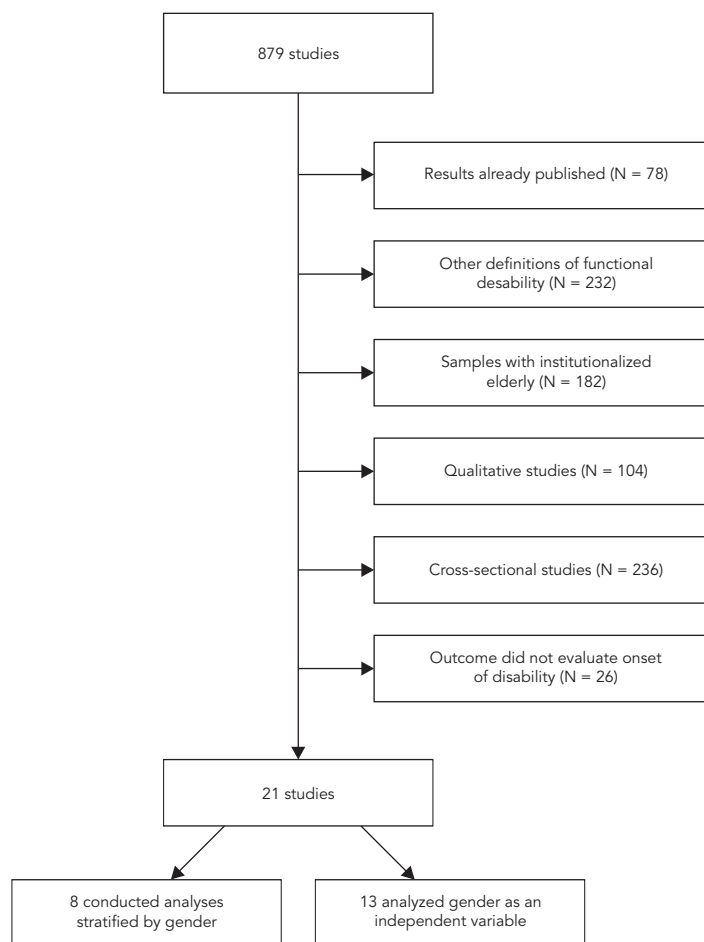
Evaluation of studies

The methodological quality of the selected studies was evaluated by applying the Downs & Black criteria [20], which analyzed data quality, internal validity, and external validity in the studies through 19 items, with a maximum score of 20.

The main characteristics of the studies were described: country in which the study was performed, principal author, year of publication, duration of study follow-up, measure(s) of disability used, sample size, baseline age, percentage of women, percentage of losses to follow-up, number of interviews performed, and Downs & Black score. Two independent reviewers evaluated the studies' methodological quality and other characteristics listed in Table 1. When there was disagreement between the evaluations, a third reviewer evaluated the study and the final decision was made by consensus between the three reviewers.

In the 21 selected studies, 30 analyses of incidence of functional disability were performed. To investigate the cause of the different results in incidence rates for functional disability between genders in the elderly according to the analyses in

the selected studies, they were divided according to the measures of disability used (basic activities of daily living, instrumental activities of daily living, and mobility) and according to adjustment of the respective analyses (crude, age-adjusted, and multivariate).

Risk factors for functional disability were defined as those evaluated through multivariate analyses and that showed a statistically significant association with higher incidence of functional disability in two or more analyses in the selected studies.

Results

Description of studies

A total of 879 articles were identified for review according to this review study's inclusion and exclusion criteria.

Table 1 provides a list of the 21 selected studies, in chronological order of publication. The studies were based on cohorts from the United States [4,5,7,8,21,22,23,24,25,26,27,28,29,30], United Kingdom [6,31], Netherlands [9], Taiwan [32], Denmark

Table 1

Characteristics of cohort studies that evaluated incidence of functional disability according to gender in the elderly (N = 21).

Country/ Cohort	Reference/ Year	Duration of study (months)	Measure of disability (no. items)	Sample size	Baseline age (years)	Percentage of women	Losses to follow-up (%)	Interviews	Downs & Black score [20] (max. 20)
USA, Alameda County	Strawbridge et al. [8]/1992	72	Basic activities of daily living (7); Mobility (2)	508	65+	59	5	2	16
USA, EPESE	Bruce et al. [21]/1994	30	Basic activities of daily living (7)	1,189	70+	52	6	2	16
USA, EPESE	Moritz et al. [28]/1995	36	Basic activities of daily living (7)	1,856	65+	58	13	5	18
USA, EPESE	Beckett at al. [5]/1996	72	Basic activities of daily living (6); Mobility (7)	14,904	65+	Not specified	16	6	13
USA, EPESE	Ferucci et al. [24]/1996	84	Basic activities of daily living (6)	6,640	69+	64	9	7	15
USA, LSOA	Dunlop et al. [22]/1997	72	Basic activities of daily living (6)	2,777	70+	59	17	4	14
USA	Peek & Coward [30]/1999	30	Basic activities of daily living (6); Instrumental activities of daily living (4)	749	65+	79	9	5	15
USA	Oman et al. [7]/999	48	Mobility (1)	1,982	55+	57	14	2	19

(continues)

Table 1 (continued)

Country/ Cohort	Reference/ Year	Duration of study (months)	Measure of disability (nº. items)	Sample size	Baseline age (years)	Percentage of women	Losses to follow-up (%)	Interviews	Downs & Black score [20] (max. 20)
United Kingdom	Grundy & Glaser [6]/ 2000	66	Basic activities of daily living (2); Mobility (3)	2,717	55+	54	26	2	15
USA, EPESE	Leveille et al. [4]/2000	84	Mobility (2)	10,100	65+	61	2	8	15
United Kingdom	Jagger et al. [31]/2001	70	Basic activities of daily living (7)	1,344	75+	59	20	5	15
USA, EPESE	Melzer et al. [27]/2001	84	Mobility (2)	8,871	65+	60	5	8	15
USA, LSOA	Dunlop et al. [23]/2002	72	Basic activities of daily living (7)	4,205	70+	67	13	4	16
Denmark and Finland, NORA	Avlund et al. [33]/2002	60	Basic activities of daily living (8); Mobility (3)	517	75+	62	8	2	15
USA	Gill et al. [25]/2004	36	Basic activities of daily living (4)	344	70+	65	4	36	17
Taiwan	Chiu et al. [32]/2004	48	Basic activities of daily living (7); Instrumental activities of daily living (8)	903	65+	50	4	2	15
Denmark, DISPHV	Avlund et al. [34]/2004	18	Mobility (6)	1,396	75+	52	4	2	18
USA	Murtagh & Hubert [29]/ 2004	156	Basic activities of daily living (3); Instrumental activities of daily living (3); Mobility (2)	1,348	60+	23	Ignored	13	15
Netherlands	Tas et al. [9]/2007	72	Basic activities of daily living (3); Mobility (5)	3,642	55+	59	15	3	19
USA	Hardy et al. [26]/2008	72	Basic activities of daily living (4)	754	70+	65	4	72	15
Denmark, DISPHV	Nilsson et al. [35]/2008	54	Mobility (6)	2,533	74+	56	3	4	19

EPESE: Established Populations for Epidemiologic Studies of the Elderly; LSOA: Longitudinal Study of Aging; NORA: Nordic Research on Ageing; DISPHV: Danish Intervention Study on Preventive Home Visits.

[33,34,35], and Finland [33] (one study was based on a sample of elderly individuals from both Denmark and Finland). Duration of follow-up ranged from 18 to 156 months. Definition of functional disability varied according to degree of disability, number of items used in each scale, and cutoff point used in each scale. Thirteen studies used a single measure of functional disability [4,7,21,22,23,24,25,26,27,28,31,34,35] and the other eight studies used two to three measures of functional disability [5,6,8,9,29,30,32,33], resulting in 30 analyses of functional disability. The study's sample size was defined as that used in the data analyses and ranged from 344 to 14,904 individuals. Baseline age varied from 55 to 75 years. The percentage of women in the samples varied from 23 to 67%, while one study [5] failed to specify the percentage of women in the sample. The percentage of losses ranged from 8 to 26%, although one study [29] failed to provide the number of losses to follow-up. All the selected studies evaluated the functional condition of individuals in the sample at baseline, and those that already presented functional disability were excluded from the analyses. Evaluation of the studies' quality based on the Downs & Black criteria [20] for non-intervention studies ranged from 13 to 19, with a maximum possible score of 20 points. The principal causes of loss of points in

the studies were failure to describe the characteristics of losses to follow-up and random variation in the main findings.

Table 2 shows the results for incidence of functional disability according to gender in the elderly and the measure of disability used. As shown in this Table, functional disability in basic activities of daily living was evaluated in 14 studies [5,8,21,22,23,24,25,26,28,29,30,31,32,33]. Of these, two observed higher incidence of functional disability in women [5,22] and 12 found no difference in the incidence between genders [8,21,23,24,25,26,28,29,30,31,32,33]. Disability in instrumental activities of daily living was examined in three studies [29,30,32]; one found a higher incidence of functional disability in women [30] and two found no difference in incidence between the genders [29,32]. Mobility disability was evaluated in nine studies [4,5,7,8,27,29,33,34,35], four of which [4,5,34,35] observed higher incidence of functional disability in women, while five [7,8,27,29,33] found no difference in incidence between genders. Three studies used instruments that combined two to three measures of functional disability [6,9,30]. One found higher incidence of functional disability in women [9], another found higher incidence in men [6], and the third found no difference in incidence between the genders [30].

Table 3 shows the results for incidence of functional disability according to gender, based on measure of disability and adjustment of the analysis (crude or multivariate). Of the 21 studies [4,5,6,7,8,9,21,22,23,28,29,30,31,32,33,34,35], twelve [6,7,21,23,25,26,27,28,29,30,32,33] conducted 18 analyses adjusted for multiple factors when analyzing incidence of functional disability. One found higher incidence of functional disability in instrumental activities of daily living in women, another found higher incidence for basic activities of daily living and mobility in men, and the others found no differences between the genders in the incidence of functional disability. The other nine studies [4,5,8,9,22,24,31,34,35] conducted 12 analyses adjusted for one or two factors, of which eight identified higher incidence of functional disability in women and four found no difference in incidence between the genders.

Risk factors for functional disability

Table 4 describes the risk factors for functional disability in at least two of the selected studies that performed adjusted analyses. Studies that performed gender-stratified analyses [9,21,27,28,29,34] allowed observing whether risks for functional disability differ between men and women.

Increasing age was the most frequent risk factor for functional disability in the selected studies [6,7,9,21,23,27,28,29,30,32], present in studies that stratified by gender, and in those whose analyses did not evaluate gender. Among the socioeconomic factors, lack of schooling [6,32] and living in rental housing [6,33] were risk factors for incidence of functional disability, regardless of gender.

Table 2

Incidence of functional disability in the elderly according to gender in analyses of functional disability measure (N = 30) in 21 selected studies.

Measures of functional disability	Incidence		
	Higher in women	Higher in men	No difference between genders
Basic activities of daily living	Beckett at al. [5]; Dunlop et al. [22]		Strawbridge et al. [8]; Bruce et al. [21]; Moritz et al. [28]; Ferucci et al. [24]; Peek & Coward [30]; Avlund et al. [33]; Dunlop et al. [23]; Gill et al. [25]; Chiu et al. [32]; Hardy et al. [26]; Murtagh & Hubert [29]; Jagger et al. [31]
Instrumental activities of daily living	Peek & Coward [30]		Murtagh & Hubert [29]; Chiu et al. [32]
Mobility	Beckett at al. [5]; Leveille et al. [4]; Avlund et al. [34]; Nilsson et al. [35]		Melzer et al. [27]; Strawbridge et al. [8]; Murtagh & Hubert [29]; Avlund et al. [33]; Oman et al. [7]
Associations			
Basic activities of daily living + Instrumental activities of daily living			Peek & Coward [30]
Basic activities of daily living + Instrumental activities of daily living + Mobility	Tas et al. [9]		
Basic activities of daily living + Mobility		Grundy & Glaser [6]	

Table 3

Incidence of functional disability in the elderly according to gender and adjustment of analyses (N = 30) in 21 selected studies.

Incidence of functional disability	Measure of functional disability	Multivariate analysis	Crude analysis
Higher in women	Basic activities of daily living		Beckett at al. [5]; Dunlop et al. [22]
	Instrumental activities of daily living	Peek & Coward [30]	
	Mobility		Beckett et al. [5]; Leveille et al. [4]; Avlund et al. [34]; Nilsson et al. [35]
	Basic activities of daily living + Mobility		Tas et al. [9]
Higher in men	Basic activities of daily living + Mobility	Grundy & Glaser [6]	
No difference between genders	Basic activities of daily living	Bruce et al. [21]; Moritz et al. [28]; Peek & Coward [30]; Avlund et al. [33]; Dunlop et al. [23]; Gill et al. [25]; Chiu et al. [32]; Hardy et al. [26]; Murtagh & Hubert [29]	Stawbridge et al. [8]; Ferucci et al. [24]; Jagger et al. [31]
	Instrumental activities of daily living	Murtagh & Hubert [29]; Chiu et al. [32]	
	Mobility	Melzer et al. [27]	Strawbridge et al. [8]
	Mobility	Murtagh & Hubert [29]	
	Mobility	Avlund et al. [33]	
	Mobility	Oman et al. [7]	
	Basic activities of daily living + Instrumental activities of daily living	Peek & Coward [30]	

Chronic conditions (stroke, arthritis, cancer, heart disease, chronic lung disease, obesity, hip fracture, and systemic arterial hypertension) were a risk factor for functional disability, regardless of gender [7,30]. Diabetes was a risk factor for functional disability according to two studies, regardless of gender [23,32]. Arthritis was a risk factor for functional disability in three studies: two that did not evaluate gender as a predictor of functional disability [26,32] and one study only in women [9]. Visual impairment was a risk factor for functional disability in two studies [7,23], regardless of gender. Body mass index (BMI) greater than 25kg/m2 was a risk factor for incidence of functional disability in both genders according to one study [9], and BMI greater than 26kg/m2 was a risk factor for incidence of functional disability in another study, regardless of gender [7]. Poor self-rated health was a risk factor for incidence of functional disability in both genders in one study [9] and in another study that did not adjust for gender [6]. Cognitive deficit was a predictor of incidence of functional disability in both genders in one study [28], in women in another study [9], and in two studies that did not evaluate gender as a risk factor [7,33]. Depression was a predictor of incidence of functional

disability in both genders according to two studies [9,21] and according to two other studies that did not evaluate gender as a risk factor [7,26]. Slow gait, defined as taking more than ten seconds to walk approximately three meters, increased the likelihood of incidence of functional disability in two studies that did not adjust for gender [25,26]. Sedentary lifestyle increased the risk of incidence of functional disability in two studies [26,33] that did not evaluate gender in their analyses. Tiredness while performing activities of daily living increased the likelihood of functional disability in both genders in one study [34] and in another study that did not evaluate gender as a predictor of functional disability [33]. Limited diversity in social relations increased the likelihood of functional disability in both genders in three studies [28,34] and in one study that did not evaluate gender as a risk factor for functional disability [33].

Table 4

Distribution of risk factors for functional disability in the elderly in the 21 selected studies, according to gender.

Risk factors	Incidence of functional disability		
	Women	Men	Gender independent
Socio-demographic			
Age	Bruce et al. [21] (Basic activities of daily living); Moritz et al. [28] (Basic activities of daily living); Melzer et al. [27] (Mobility); Tas et al. [9] (Basic activities of daily living + Mobility); Murtagh & Hubert [29] (Basic activities of daily living + Instrumental activities of daily living + Mobility)	Moritz et al. [28] (Basic activities of daily living); Melzer et al. [27] (Mobility); Tas et al. [9] (Basic activities of daily living + Mobility)	Oman et al. [7] (Mobility); Peek & Coward [30] (Basic activities of daily living + Instrumental activities of daily living); Grundy & Glaser [6] (Basic activities of daily living + Mobility); Dunlop et al. [23] (Basic activities of daily living); Chiu et al. [32] (Basic activities of daily living + Instrumental activities of daily living)
Lack of schooling			Grundy & Glaser [6] (Basic activities of daily living + Instrumental activities of daily living + Mobility); Chiu et al. [32] (Basic activities of daily living + Instrumental activities of daily living)
Rental housing			Avlund et al. [33] (Mobility); Grundy & Glaser [6] (Basic activities of daily living + Instrumental activities of daily living + Mobility)
Health conditions			
Chronic conditions			Oman et al. [7] (Mobility); Peek & Coward [30] (Basic activities of daily living)
Diabetes			Chiu et al. [32] (Basic activities of daily living + Instrumental activities of daily living); Dunlop et al. [23] (Basic activities of daily living)
Arthritis	Tas et al. [9] (Basic activities of daily living + Mobility)		Chiu et al. [32] (Basic activities of daily living); Hardy et al. [26] (Basic activities of daily living)
Visual impairment			Oman et al. [7] (Mobility); Dunlop et al. [23] (Basic activities of daily living)
BMI > 25kg/m2	Tas et al. [9] (Basic activities of daily living + Mobility)	Tas et al. [9] (Basic activities of daily living + Mobility)	
BMI > 26kg/m2			Oman et al. [7] (Mobility)
Poor self-perceived health	Tas et al. [9] (Basic activities of daily living + Mobility)	Tas et al. [9] (Basic activities of daily living + Mobility)	Grundy & Glaser [6] (Basic activities of daily living + Instrumental activities of daily living + Mobility)
Poor cognitive function	Moritz et al. [28] (Basic activities of daily living); Tas et al. [9] (Basic activities of daily living + Mobility)	Moritz et al. [28] (Basic activities of daily living)	Avlund et al. [33] (Mobility); Oman et al. [7] (Mobility)
Depression	Tas et al. [9] (Basic activities of daily living + Mobility); Bruce et al. [21] (Basic activities of daily living)	Tas et al. [9] (Basic activities of daily living + Mobility); Bruce et al. [21] (Basic activities of daily living)	Oman et al. [7] (Mobility); Hardy et al. [26] (Basic activities of daily living)
Slow gait *			Gill et al. [25] (Basic activities of daily living); Hardy et al. [26] (Basic activities of daily living)
Sedentary living			Hardy et al. [26] (Basic activities of daily living); Avlund et al. [33] (Basic activities of daily living)
Tiredness during physical activities	Avlund et al. [34] (Mobility)	Avlund et al. [34] (Mobility)	Avlund et al. [33] (Basic activities of daily living + Mobility)
Social relations			
Little diversity in social relations	Moritz et al. [28] (Basic activities of daily living); Avlund et al. [34] (Mobility)	Moritz et al. [28] (Basic activities of daily living); Avlund et al. [34] (Mobility)	Avlund et al. [33] (Basic activities of daily living + Mobility)

* Takes more than 10 seconds to walk approximately three meters.

Discussion

The diversity of instruments used to measure functional disability, study populations, follow-up period, number of interviews, and data analysis methods hindered the comparison of results between the selected studies. Nevertheless, according to this review, regardless of the measure adopted, the incidence of functional disability was higher in women in the majority of the studies that used bivariate analysis or adjustment for one or two factors, while there was no difference between the genders in the incidence of functional disability when adjusting for socioeconomic and health conditions and social relations. A previous review study of risk factors for functional disability [36] had already observed that two studies that adjusted the analyses for chronic health conditions [37,38] found a similar onset of functional disability between the genders.

Analyses with different adjustments in studies with the same cohort of elderly

Using data from the EPESE study (Established Populations for Epidemiologic Study of the Elderly), Leveille et al. [4], in an analysis stratified by sex and adjusted for age only, observed higher incidence of mobility disability in women. Using data from the same cohort, Melzer et al. [27] found that by stratifying for schooling, the incidence of mobility disability was higher in the group with less schooling (0-7 years), making the risk of functional disability similar between men and women.

Dunlop et al. [22], using data from LSOA (Longitudinal Study of Aging), in an analysis of incidence of functional disability in basic activities of daily living, adjusting for age and schooling, observed higher incidence of functional disability in women. In data from the same cohort, Dunlop et al. [23], without adjusting for chronic health conditions (arthritis, cancer, cardiovascular diseases, diabetes, hearing impairment, obesity, osteoporosis, and visual impairment), found similar incidence of functional disability in basic activities of daily living in men and women.

By using data from the same cohort, these studies allow ruling out the hypothesis that population differences could explain the differential effect of gender on functional disability. Meanwhile, these studies confirmed that the studies' variability on the effect of gender on functional disability in the elderly is due to the indicators for which the analyses are adjusted.

Adjusted analyses that found a difference between genders in the incidence of functional disability

Only two of the studies that conducted multivariate analyses showed different incidences between genders. Methodological issues may explain the disparity between results of these studies and others that adjusted for various factors. Grundy & Glaser [6] found higher incidence of functional disability in basic activities of daily living and mobility in men in a study that used an instrument that measures less severe limitations than the majority of studies, facilitating the perception of functional disability by men, and that evaluates hearing loss which usually has higher incidence and prevalence in men, in addition to not being included in the traditional instruments that measure functional disability [39,40]. Peek & Coward [30] observed higher incidence of functional disability in instrumental activities of daily living in women in a study whose sample consisted of elderly individuals with arthritis. The instrument that measures instrumental activities of daily living uses some questions like doing housework, preparing meals, and grocery shopping, which are considered "women's work", and which lead to a differential assessment between genders [41]. The study showed the highest proportion of women among the selected studies (79%), since arthritis is more prevalent in women [42,43].

Risk factors for functional disability

Increasing age was the most frequent risk factor for functional disability among the selected studies, independently of gender, which had already been observed in a previous review study [36] and proved the trend towards functional decline with increasing age in the elderly.

Among the socioeconomic factors, low schooling and living in rental housing increased the risk of functional disability, regardless of gender, showing that elderly individuals in worse socioeconomic conditions are more vulnerable to incidence of functional disability, as previously observed in other studies [44,45,46,47].

Among the health indicators, chronic health conditions increased the risk of incidence of functional disability, regardless of gender, as observed in other studies [37,48,49]. Considering that only one study evaluated arthritis as an independent variable in a gender-stratified analysis, it is not possible to rule out that arthritis may represent a greater risk of functional disability in women, as observed in previous studies [42,43].

The higher risk of functional disability in elderly individuals with limited diversity in their

social relations highlights the importance of social ties for their health [50].

Despite the small number of studies that used gender-stratified analyses, except for arthritis, the predictors of functional disability are the same in men and women.

Conclusions

According to this review, gender is not a risk factor for incidence of functional disability in the elderly. Rather, age, socioeconomic and health conditions, and social relations determine the incidence of functional disability. Prevention of functional disability in men and women should act on the risk factors that are amenable to intervention, like sedentary lifestyle and limited diversity of social relations. In relation to these factors, measures like physical activity and maintaining social ties should be encouraged, regardless of gender.

The results of this review were reinforced by the opportunity to compare findings from studies that used crude analyses [4,22] with others that used adjusted analyses [23,27] based on the same cohort's database. Studies that used crude analyses observed a different incidence of functional disability between the genders in the elderly, while studies that adjusted their analyses for socio-demographic, socioeconomic, and health factors observed no difference between the genders in the incidence of functional disability. Methodological difficulties in this review indicate the need for standardized measures of functional disability to allow comparability of the studies' results and taking precautions starting with the study's initial planning in order to prevent losses

to follow-up, thus avoiding analyses from being performed with data from the healthiest individuals. Equally important is to avoid dichotomization of functional disability when the study instrument contains more than one question on functional capacity. Dichotomization inappropriately simplifies the information on functional capacity, leading to classification errors and false conclusions. The use of multiple measures of functional disability allows better capturing of subtle differences in functional capacity in the elderly. Another observation in this review study is that data collection instruments should draft the questions on functional disability in the present tense, since hypothetical questions can induce answers that are influenced by cultural factors and family arrangements.

Limitations

Except for one article [32], the studies selected in this review were conducted in developed countries, which limits extrapolation of the findings to developing countries, where there is greater social and economic inequality, with probable impact on functional disability in the elderly.

The possibility of publishing bias cannot be ruled out, since only one study showed higher incidence of functional disability in men.

Measures of functional disability were collected through self-reported data, except in one of the studies [7]. However, besides the fact that the validity of self-reported (as compared to observed) data has already been proven in both genders [51], this issue does not compromise comparison of the studies.

Resumo

Esta revisão sistemática teve por objetivo avaliar o efeito do gênero sobre a incidência de incapacidade funcional em idosos. A pesquisa de publicações nas bases eletrônicas de dados MEDLINE, EMBASE e ProQuest no período de janeiro de 1990 a março de 2008 identificou 879 publicações, das quais foram selecionados 21 estudos de coortes que avaliaram gênero como variável independente e incidência de incapacidade funcional em idosos como desfecho. A revisão dos estudos selecionados demonstrou que após ajuste para indicadores sócio-econômicos, de saúde e de relações sociais a incidência de incapacidade funcional foi semelhante entre os gêneros. Os principais fatores de risco para incapacidade funcional, independente do gênero dos idosos, foram: falta de escolaridade, moradia alugada, doenças crônicas, diabetes, déficit visual, índice de massa corporal acima de 25, autopercepção de saúde como não boa, déficit cognitivo, depressão, marcha lenta, sedentarismo, cansaço ao realizar as atividades diárias e pouca diversidade nas relações sociais.

Saúde do Portador de Incapacidade; Idoso Fragilizado; Gênero e Saúde

Contributors

M. A. P. Rodrigues participated in all stages of the study, including the planning, literature search, study selection, evaluation of studies, and final elaboration of the article. L. A. Facchini participated in the planning, evaluation of selected studies, and final revision. E. Thumé participated in the evaluation of the selected studies and elaboration of the article. F. Maia participated in the literature search, study selection, and elaboration of the article.

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