

Chronic diseases, locomotor activity limitation and social participation in older women: cross sectional survey of British Women's Heart and Health Study

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Abstract

Objectives: to examine the association of chronic degenerative diseases with locomotor activity limitation and social participation among older British women.

Methods: cross-sectional survey of 4,286 women aged 60–79 years from 23 towns in England, Scotland and Wales.

Results: the prevalence of locomotor activity limitation was 37.2% and 33.5% of women had difficulty with some aspect of social participation. This prevalence of locomotor activity limitation and difficulties with social participation increased with increasing age and with increasing number of chronic diseases. All chronic diseases assessed were independently (of each other and confounding factors) associated with locomotor activity limitation. Associations were particularly strong for stroke (OR 5.44, 95% CI 3.38–8.75), arthritis (OR 3.95, 95% CI 3.25–4.81) and coronary heart disease (OR 2.26, 95% CI 1.77–2.88). The population attributable fraction for locomotor activity limitation was greatest for arthritis: 37.8% (95% CI 32.0–43.1) and coronary heart disease: 6.7% (95% CI 4.8–8.8). Locomotor activity limitation was strongly associated with social participation. Most chronic diseases of ageing were independently (of locomotor activity limitation, other chronic diseases and confounding factors) associated with reduced social participation.

Conclusions: locomotor activity limitation and difficulties in social participation are common. Arthritis and coronary heart disease contribute importantly to locomotor activity limitation and difficulties with social participation. Effective strategies to prevent or limit the disabling impact of these conditions are essential to improving the quality of life of older women.

Keywords: locomotor activity, women, morbidity, chronic disease

Introduction

The projected population prevalence of disability in old age is a major public health concern [1]. Developing appropriate preventive strategies for disability requires an understanding of the important causes [2]. Chronic diseases common in older age, such as cardiovascular diseases, arthritis and diabetes, have been found in some studies to be associated with disability [3–5] and more specifically, associated with locomotor disability in men [6]. Fewer studies have been undertaken in women, yet the expectation of living with disability in old age is higher among women than men [7–12], although their risk of smoking related chronic diseases is

lower than in men. In addition to the lack of information in women, studies of the associations of chronic diseases with activity limitation have been criticised for inadequate control of confounding factors, such as socio-economic position and lifestyle factors [13], which may lead to over-estimation of the disabling effects of diseases that are themselves socially patterned.

The current World Health Organisation classification which includes the concepts of activity and participation provides for more complex relationships [14] than its predecessor (ICIDH) [15], in particular, to achieve a synthesis of the medical and social approaches to disablement. While locomotor activity limitation is of itself a serious limitation, less

attention has been paid to the relationship between morbidity and limitations in participation. In this analysis we have concentrated on examining the relationship between only three components of the International Classification of Functioning, Disability and Health (ICF) model, health condition, activities and participation among older women in the UK.

Methods

Participants

The British Women's Heart and Health Study is a sample of women aged 60–79 years randomly selected from general practitioner lists from 23 towns across England, Scotland and Wales. Selection of towns, general practitioners and participants was based on the methods used for the British Regional Heart Study of men [16]. A total of 4,286 women (60% of those invited) participated and baseline data were collected between April 1999 and March 2001. Participants completed a questionnaire requesting information on a wide range of risk factors, and attended a local health centre where a research nurse interview, physical examination and blood sampling were undertaken. Ethics committee approval was obtained for the study and full details of participant selection and measurements have been reported previously [17].

Measurements

Locomotor activity limitation

For the purposes of this analysis we are using the WHO definition of 'activity limitation', which refers to difficulties an individual may have in executing activities [14]. However, we did restrict this to limitations in locomotor activities. Unfortunately we did not have data on the interaction between the individual and the environment. The women were asked whether they currently had difficulty carrying out any of the six following activities on their own as a result of a long term health or medical problem or due to old age: (i) going up or down stairs; (ii) bending down; (iii) straightening up; (iv) keeping balance; (v) going out of the house; (vi) walking 400 yards. Women were also asked if they had experienced any falls in the previous 12 months. Those who responded positively to any of the six questions or had experienced three or more falls in the last 12 months were described as having locomotor activity limitation. The same definition of locomotor activity limitation has been used in previous studies [6].

Participation

We used the WHO definition of 'participation restriction' which refers to problems an individual may experience in involvement in life situations [14]. Women were asked (yes or no) if their present state of health was causing problems with any of the following: job (paid employment), household chores, social life, sex life, interests and hobbies, holidays and outings, and family relationships. Like the measure of activity limitation, we were not able to ascer-

tain the environmental component of any difficulties with participation.

Chronic diseases

Women were asked if they recalled a doctor diagnosis of any of the following conditions: heart attack, heart failure, angina, other heart trouble, stroke, any cancer, asthma, bronchitis, depression, gastric / peptic / duodenal ulcer (referred to as peptic ulcer for simplicity in remainder of article), gout, gall bladder disease, osteoporosis, thyroid disease, cataract, glaucoma. In addition general practitioner medical records were reviewed for each participant and details of diagnoses of cardiovascular disease, diabetes and cancer were extracted. Coronary heart disease (myocardial infarction, angina, heart failure), stroke and diabetes were defined as either a self-report of a doctor diagnosis or presence of a diagnosis in the general practitioner record (as these were among the primary outcomes of interest in the study). All other conditions were defined according to self-report of a doctor diagnosis.

Statistical analysis

Proportions of participants with chronic diseases of ageing and locomotor activity limitation were calculated along with 95% confidence intervals. Multiple logistic regression was used to assess the association between chronic diseases and locomotor activity limitation with adjustment for potential confounding factors (age, social class, body mass index, smoking and alcohol intake) and simultaneous adjustment for each other chronic disease so that independent effects could be determined. Multiple logistic regression was also used to assess the association between chronic diseases and social participation. In these models adjustment for potential confounding factors, other chronic diseases and in addition for locomotor activity limitation were undertaken. In the logistic regression models age and body mass index were entered as continuous variables and each chronic disease, locomotor activity limitation and participation activities as dichotomous variables. Smoking (never, ex, current at one of four levels: 1–9, 10–19, 20–29, ≥ 30 cigarettes per day) and social class (I, II, III non-manual, III manual, IV, V) were entered as categorical variables together with a dummy variable (separate category) for those on whom adult social class data was unavailable ($n = 444$). A sensitivity analysis was performed comparing the results using this variable for social class with one for which the social class data were kept as missing. Coding missing as a separate category did not impact upon the point estimates. Adjusted population attributable fractions (PAF) were calculated from the population prevalence of each disease in the study population. All analyses were conducted using STATA 7.

Results

Table 1 shows the prevalence of chronic diseases, locomotor problems and social participation in the study population. Nearly 50% had arthritis, with bronchitis (19%),

Table 1. Prevalence of chronic disease, locomotor activity limitation and social participation

	All ages			60–69 years			70–79 years		
	N with data	N with condition	% (95% CI)	N with data	N with condition	% (95% CI)	N with data	N with condition	% (95% CI)
Chronic diseases									
Stroke	4219	131	3.1 (2.6–3.7)	2280	52	2.3 (1.7–3.0)	1936	79	4.1 (3.2–5.1)
CHD	4242	694	16.4 (15.2–17.5)	2291	295	12.9 (11.5–14.3)	1948	399	20.5 (18.7–22.3)
Other heart disease	3718	294	7.9 (7.1–8.8)	2037	134	6.6 (5.5–7.7)	1677	158	9.4 (8.1–10.9)
Diabetes	3913	216	5.5 (4.8–6.3)	2120	113	5.3 (4.4–6.4)	1790	102	5.7 (4.7–6.9)
Arthritis	3788	1830	48.3 (46.7–49.9)	2062	927	45.0 (42.8–47.1)	1722	900	52.3 (49.9–54.6)
Gout	3823	104	2.7 (2.2–3.3)	2080	48	2.3 (1.7–3.0)	1740	56	3.2 (2.4–2.2)
Gastric/peptic ulcers	3844	299	7.8 (7.0–8.7)	2090	137	6.6 (5.5–7.7)	1751	162	9.3 (7.9–10.7)
Gall bladder disease	3852	355	9.3 (8.4–10.2)	2085	174	8.4 (7.2–9.6)	1744	181	10.4 (9.0–11.9)
Asthma	3879	474	12.2 (11.2–13.3)	2109	264	12.5 (11.1–14.0)	1766	209	11.8 (10.4–13.4)
Bronchitis	3881	737	19.0 (17.8–20.3)	2102	394	18.7 (17.1–20.5)	1776	343	19.3 (17.5–21.2)
Depression	3845	677	17.6 (16.4–18.8)	2081	403	19.4 (17.7–21.1)	1761	273	15.5 (13.8–17.3)
Cancer	4049	367	9.1 (8.2–10.0)	2192	182	8.3 (7.2–9.5)	1853	183	9.9 (8.6–11.3)
Thyroid disease	3839	457	11.9 (10.9–13.0)	2096	234	11.2 (9.8–12.6)	1740	223	21.8 (11.3–14.5)
Cataract	3830	527	13.8 (12.7–14.9)	2077	135	6.5 (5.5–7.6)	1750	392	22.4 (20.5–24.4)
Glaucoma	3781	143	3.8 (3.2–4.4)	2063	47	2.3 (1.7–3.0)	1715	96	5.6 (4.6–6.8)
Locomotor activity limitation									
Going up and down stairs	3621	844	23.3 (21.9–24.7)	1974	394	20.0 (18.2–21.8)	1647	450	27.3 (25.2–29.5)
Bending down	3569	849	23.8 (22.4–25.2)	1938	391	20.2 (18.4–22.0)	1631	458	28.1 (25.9–30.3)
Straightening up	3488	736	21.1 (19.8–22.5)	1910	361	18.9 (17.2–20.7)	1578	375	23.8 (21.7–25.9)
Keeping your balance	3482	438	12.6 (11.5–13.7)	1907	185	9.7 (8.4–11.1)	1575	253	16.1 (13.2–16.8)
Going out of the house	3439	202	5.9 (5.1–6.7)	1886	83	4.4 (3.5–5.4)	1553	119	7.7 (6.4–9.1)
Walking 400 yards	3495	514	14.7 (13.5–15.9)	1913	224	11.7 (10.3–13.2)	1582	290	18.3 (16.5–20.3)
Any of the above	3718	1356	36.5 (34.9–38.0)	2006	629	31.4 (29.3–33.4)	1712	727	42.5 (40.1–44.8)
≥3 falls in 12 months	4046	113	2.8 (2.3–3.4)	2191	51	2.3 (1.7–3.0)	1851	63	3.4 (2.6–4.3)
Mobility problems or falls	3725	1386	37.2 (35.7–38.8)	2009	646	32.2 (30.1–34.2)	1716	740	43.1 (40.8–45.5)
Social participation									
Job	2989	54	1.8 (1.4–2.4)	1739	40	2.3 (1.6–3.1)	1250	14	1.1 (0.6–1.9)
Household chores	3883	844	21.7 (20.4–23.1)	2110	394	18.7 (17.0–20.4)	1771	449	25.4 (23.2–27.4)
Social life	3754	540	14.4 (13.3–15.5)	2066	260	12.6 (11.1–14.1)	1687	280	16.6 (14.9–18.5)
Sex life	3237	250	7.7 (6.8–8.7)	1914	167	8.7 (7.5–10.1)	1322	83	6.3 (5.0–7.7)
Interests and hobbies	3686	477	12.9 (11.9–14.1)	2045	252	21.3 (10.9–13.8)	1640	225	13.7 (21.1–15.5)
Holidays and outings	3776	572	15.2 (14.0–16.3)	2071	259	12.5 (11.1–14.0)	1704	313	18.4 (16.6–20.3)
Family relationships	3714	114	3.1 (2.5–3.7)	2052	67	3.3 (2.5–4.1)	1661	47	2.8 (2.1–3.7)

depression (18%) and coronary heart disease (16%) also being common among these women. The prevalence of overall locomotor activity limitation was 37.2% (95% CI 35.7–38.8) and 33.5% (95% CI 31.9–35.2) had problems with at least one aspect of social participation. Chronic disease prevalence, locomotor activity limitation and reduced social participation all increased with increasing age.

Association between chronic diseases of ageing and locomotor activity limitation

Figure 1 shows the proportion of individuals with each chronic disease who had locomotor activity limitation. At least 50% or more of participants with stroke, coronary heart disease, ulcers, asthma, arthritis, depression, diabetes mellitus and bronchitis had locomotor activity limitation.

Table 2 shows the associations between these chronic conditions and locomotor activity limitation. In this analysis bronchitis and asthma were combined into one category ‘respiratory disease’ and gout was combined with arthritis. Those conditions that are associated with activity limitation prevalence of <50% were combined into one category: ‘any other chronic disease’.

All of the chronic diseases were independently (of each other and potential confounding factors) associated with locomotor activity limitation, with stroke (OR 5.44, 95% CI 3.38–8.75), arthritis (OR 3.95, 95% CI 3.25–4.81), and coronary heart disease (OR 2.26, 95% CI 1.77–2.88) particularly strongly associated with increased odds of activity limitation. Arthritis had the highest population attributable factor: 37.8% (95% CI 32.0–43.1%) followed by coronary heart disease: 6.7% (95% CI 4.5–8.8%). The population attributable fraction for stroke was 2.1% (95% CI 1.5–2.6%). The relationship between each of the chronic conditions and the seven individual components that were used to generate the locomotor activity limitation measure were examined and showed similar findings to the composite measure (data not presented), suggesting that these associations were not driven by one particular aspect of locomotor activity limitation.

Association between chronic diseases and limitations in participation

Appendix 1 (available as supplementary data at <http://www.ageing.oupjournals.org>) shows the associations between chronic diseases and measures of social participation.

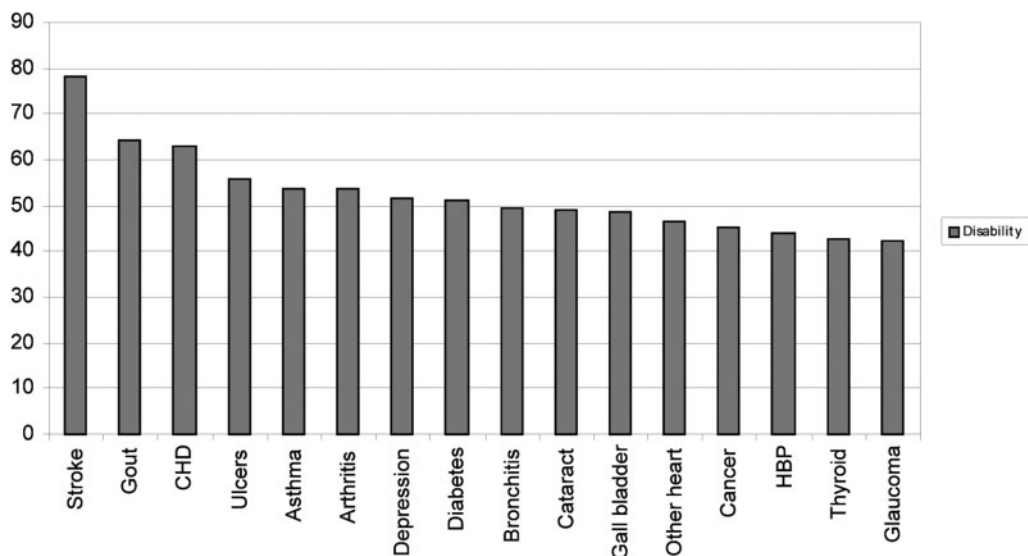


Figure 1. Prevalence of activity limitation by conditions reported.

Table 2. Associations between chronic diseases and locomotor activity limitation

	% (95% CI) disabled	Age adjusted odds ratio for activity limitation (95% CI)	Age and confounder ^a adjusted odds ratio for activity limitation (95% CI)	Age, confounder ^a and other chronic disease ^b adjusted odds ratio for activity limitation (95% CI)
Coronary heart disease	63.0 (59.1–66.7)	2.90 (2.28–3.67)	2.50 (1.98–3.16)	2.26 (1.77–2.88)
Stroke	78.2 (69.5–84.9)	5.03 (3.29–7.70)	4.38 (2.87–6.68)	5.44 (3.38–8.75)
Diabetes	51.3 (45.5–55.6)	1.93 (1.37–2.72)	1.33 (0.94–1.86)	1.21 (0.78–1.88)
Arthritis (including gout)	53.6 (51.3–56.0)	4.35 (3.61–5.25)	4.12 (3.37–5.02)	3.95 (3.25–4.81)
Depression	51.5 (47.6–55.4)	2.05 (1.65–2.55)	1.93 (1.55–2.41)	1.60 (1.27–2.02)
Respiratory disease (bronchitis or asthma)	49.3 (46.1–52.6)	1.90 (1.61–2.24)	1.82 (1.49–2.23)	1.64 (1.32–2.03)
Peptic or gastric ulcer	55.8 (49.9–61.6)	2.16 (1.65–2.82)	2.03 (1.55–2.67)	1.50 (1.14–1.98)
Any other chronic disease	30.8 (28.9–32.9)	1.50 (1.28–1.75)	1.46 (1.23–1.72)	1.16 (0.97–1.39)

^aConfounding factors: social class, smoking, alcohol consumption, body mass index.

^bOther chronic diseases: simultaneous adjustment for all other chronic diseases.

Locomotor activity limitation was strongly associated with all forms of participation. The strongest association observed was that between locomotor activity limitation and problems with household chores (OR 17.00, 95% CI 12.91–22.38). Almost all of the chronic diseases were independently (of each other, locomotor activity limitation and confounding factors) associated with reductions in most forms of social participation. Coronary heart disease, stroke, arthritis and depression were independently associated with difficulties in family relationships.

Discussion

Over one third of women aged 60–79 reported some locomotor activity limitation, a similar proportion reported difficulties with at least one aspect of participation. The strongest associations between chronic disease and locomotor activity limitation were observed for stroke and arthritis. Given the high prevalence of arthritis (48.3% in this sample), this had the greatest population attributable fraction accounting for 38% of locomotor activity limitation. Assuming at least

some of the relationship between arthritis and locomotor activity limitation is causal, even only moderately effective interventions for the prevention and treatment of arthritis would be expected to reduce the prevalence of locomotor activity limitation by a large amount.

Not surprisingly strong associations were observed between locomotor activity limitation and the measures of participation. However, the independent associations between most chronic diseases and most measures of participation indicate that the relationship between these diseases and participation is not only via locomotor activity limitation.

Comparisons with other studies

The prevalence of locomotor activity limitation observed in the present study is markedly lower than estimates from a British National survey of disability conducted 15 years ago (65.9% of adults aged 60 and above) compared to 37.2% in our study for women of this age group [18]. These differences are most likely due to the use of different measures of locomotor activity limitation in the two studies. The ONS measure of locomotor disability was based on responses to

16 individual items and reporting difficulty with any of these items would be classified as having locomotor disability on a dichotomous scale. The measure used here was based on only seven items, therefore, are less likely to be recorded as having activity limitation. It is also possible that prevalence of activity limitation is reducing over time; however, data are conflicting with more severe disability showing a downward trend [19] and more general indicators of disability showing no trend [20]. If we are to believe the compression of morbidity hypothesis (improvements in survival are paralleled with decreasing prevalence of disability) [21] this might be expected.

Selection bias of more healthy participants (as those in better health are more likely to participate in research) may also result in a lower prevalence of locomotor activity limitation than expected and it is evident that our sample was affected to an extent by poorer representation of women with a high likelihood of activity limitation.

The strongest associations between disease and locomotor activity limitation were observed for stroke, arthritis and CHD among women in our study. These findings are consistent with a recent study of similar aged British men [6] suggesting that these conditions have similar effects on locomotor activity limitation in both sexes.

We found strong associations between chronic diseases and locomotor activity limitation and between locomotor activity limitation and all forms of participation. However, our results also suggest that the associations between chronic disease and participation are not simply explained by a linear relationship from disease through activity limitation to reduced participation. These results must be interpreted with caution, as only locomotor activity limitation was considered in this analysis. Some of the relationship between the measures of participation and morbidity may be explained by other domains of activity limitation, for example, dexterity, communication or sensory limitations or be further mediated by environmental factors not measured in this study.

Study limitations

Our response (60%) is moderate but consistent with other baseline data collection in large epidemiological surveys including that for the Health Survey for England in which participants were visited in their own homes [22]. Non-responders tended to be older and more likely to have had a general practitioner record of stroke compared to responders but proportions of general practitioner records of other chronic diseases were similar between responders and non-responders [17]. Any response bias would therefore be likely to lead to an underestimation in the prevalence of locomotor activity limitation in our study but is unlikely to have biased any of the associations between chronic disease and participation. The age and social class distribution of the British Women's Heart and Health Study is similar to that found for the 1991 census [17]. Only self-report data were available for several of the chronic conditions examined, previous work has suggested that mobility limitation is associated with over reporting of many chronic diseases. This possible differential misclassification may have caused an overestimation of the strength of the relationship

between those chronic illnesses measured by self-report alone (including arthritis) and activity limitation [23]. Our study is cross-sectional, therefore, it is impossible to be certain of the temporality of events and causative pathways. Whilst it is plausible that locomotor activity limitation is caused by chronic illness, it is also plausible that chronic illness may be induced or be aggravated by the presence of locomotor activity limitation. These relationships are likely to take the form of feed-back loops, implying the PAFs estimated here would be overestimated.

The analysis only considered data relating to the presence or absence of chronic conditions; no measures of the severity or frequency of symptoms were incorporated. However, it has been found that quality of symptoms do affect associations between morbidity and locomotor activity limitation [24].

A limitation of the data collected was that for both measures of activity and participation we were unable to consider the impact of the individual's environment in responding to these questions. For example, whether problems with climbing stairs were related to lack of a rail, or problems with sex life were due to partner's rather than individual factors.

Implications

Nearly two-fifths of older British women have locomotor activity limitation and locomotor activity limitation is strongly associated with difficulties with measures of participation. Chronic diseases common in older age are associated with locomotor activity limitation and independently with participation. It would be expected that strategies aimed at preventing such chronic diseases and limiting their disabling effects would be central to reducing the population prevalence of locomotor activity limitation. For example, reaching standards set out in the UK government's recently produced National Service Frameworks for Coronary Heart Disease [25] and Older People [26] would be expected to contribute to reducing both the burden of chronic diseases and associated locomotor activity limitation. If the relationship is causative, then adequate secondary prevention in older people with cardiovascular disease or arthritis would also reduce morbidity and activity limitation [27, 28].

Key points

- Few studies have considered the association of chronic degenerative diseases with locomotor activity limitation and social participation among older women.
 - In a nationally representative sample of British women aged 60–79 over one third reported locomotor activity limitation and limitations in social participation.
 - Associations between chronic disease and locomotor activity limitation were strongest for stroke and arthritis.
 - Most chronic diseases of ageing were independently (of locomotor activity limitation, other chronic diseases and confounding factors) associated with reduced social participation.
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Contributions

All authors developed the study aim and design. JA undertook the initial analysis and coordinated writing of the paper. All authors contributed to the final version.

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