Title: Differential risk factor profiles for indoor and outdoor falls in older people living at home in Nottingham (UK).

Sub-title: **Indoor and outdoor falls in older people.**

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Abstract

The objectives of this work were: to estimate the incidence of falls within an at-risk group of community dwelling elderly people; to assess the risk factors associated with incident falls; to examine the effects of incident falls on survival. A random sample of 1042 community dwelling older people in Nottingham (UK) were interviewed in 1985 and survivors re-interviewed at four-year follow-up. The at-risk group was defined as survivors who had not fallen in the year prior to the baseline interview (n=444). One-year fall recall was assessed using a questionnaire and included physical health, mobility, prescribed drugs and time spent walking. Body-weight and handgrip strength were measured. Eight-year post-fall mortality was recorded. In 1989 117 new fallers were identified. These people fell a total of 233 times in the year prior to re-interview (incidence rate=524.8 per 1000 person-years at risk; 95% confidence intervals 473.3-576.3). People aged less than 75 were more likely to fall outdoors than people aged 75 and over (χ^2=5.715, df=1, p=0.017). Risk factors associated with falling were: being less healthy (odds ratio=0.55; p=0.052); having a walking speed in the range stroll/very slow/non-ambulant compared with normal/brisk/fast (odds ratio = 1.99; p<0.01); and number of prescribed drugs (odds ratio=1.30; p=0.01). When analysed separately, indoor and outdoor falls presented differential risk profiles, with evidence that indoor falls were associated with frailty, while outdoor falls were associated with compromised health status in more active people. In eight-year post-fall monitoring, multiple (3+) fallers and indoor fallers showed a significant excess mortality. The differences in risk factors for, and prognoses following, indoor and outdoor falls, emphasise the complex interactions between intrinsic and extrinsic factors associated with falling among older people.

Keywords:

Indoor and outdoor falls; older people.

Abbreviations:

NLSAA: Nottingham Longitudinal Study of Activity and Ageing.

CPA: customary physical activity.

Introduction

Falls represent the most frequent cause of injury-related morbidity and mortality in people age 65 and over living in the community [1]. The multifactorial origins of such falls are now well established [1,2,3] with the research literature strongly implicating lower health status [4,5,6], medication use [3,5,7,8,9,10,11,12] and lower muscle strength [13,14,15,16] in the risk profile of elderly fallers. Recent evidence has also implicated activity-related aspects of lifestyle in the aetiology of falls [4,17,18,19,20], but here the risk-activity relationship is clearly non-linear. Serious falls injury has been associated with both relatively high [4,17,18], and relatively low [18,19] levels of physical activity, while diversity of activity has been found to be protective from falls injuries [4,20]. Such results strongly suggest that levels of habitual or customary physical activity link with both intrinsic and extrinsic causes of falling [1,2]. Thus while lower activity levels may reflect frailty and lower muscle strength (intrinsic causes), higher activity levels may increase exposure to hazard situations and opportunities for falling (extrinsic causes). Exploring the nature of this relationship, however, is further complicated by findings which indicate that low levels of activity not only contribute to the cause of falls [17,21], but may also result from earlier falls [14,22,23,24]. Several reports, for example, have drawn attention to self-imposed activity restrictions among those who have experienced one or more previous falls [14,22,23,24]. The distinction, frequently made in the current literature, between indoor and outdoor falls may also have a bearing on the activity-risk relationship, since many high-level, and possibly higher risk, activities (e.g. recreational walking, shopping, home maintenance, etc.) are performed outdoors.

Using data from an 8-year longitudinal study of representative elderly community-based patients, the present analyses were designed to identify new fallers in

order to assess risks associated with earlier reported activity level and aspects of general health and anthropometry. In this context, analyses also focus on: the reported location of the fall (indoors versus outdoors); the reported frequency of falls (single versus multiple); and 8-year mortality following incident falls.

Method

Sample

Data were derived from the Nottingham Longitudinal Study of Activity and Ageing (NLSAA) [25], the original sample for which was constructed as follows. Using small area statistics from the 1981 national census, three areas of greater Nottingham, UK, were combined to provide a study population whose demographic composition (as regards age, sex, social class, ethnicity and proportion of elderly people living alone) reflected the average national pattern for England and Wales. The resulting area included a total of 48 733 individuals served by 25 General Practitioners. With the consent and co-operation of these General Practitioners, National Health Service age-sex lists were used to identify all non-institutionalised individuals aged 65 years and over living within the survey areas. Of 8409 elderly people identified, 1299 eligible individuals were randomly selected for interview.

Baseline and follow-up surveys

The first (baseline) survey was conducted between May and September 1985. Of 1299 individuals approached, 1042 were interviewed, giving a response rate of 80% (507 aged 65-74, 535 aged 75+; 636 women, 606 men). The age/sex structure of the interviewed sample did not differ significantly from the original target sample and showed no evidence of age or sex bias [26]. In order to preserve numbers for longitudinal analyses, yet allow for change in the variables of interest, 4-year follow-up periods were considered optimal. Information on mortality within the baseline sample was provided by the National Health Service Central Register, where all UK deaths are recorded, and which supplied copies of all death certificates as they accrued. The first follow-up was conducted between May and September 1989. All surviving respondents from 1985 who were still resident in Nottingham were invited

to continue their participation. Overall, 261 people from the original sample had died by 1989. Of the remaining 781 people available for follow-up, 690 agreed to be re-interviewed (re-interview rate=88%), 63 people refused, 25 people were untraceable and 3 people had emigrated. All interviews were conducted by trained interviewers. Interviewer training, and the methods of respondent contact to ensure a representative sample have been described in earlier reports [26,27].

Interview Questionnaire

The interview questionnaire included sections covering cognition, health, customary physical activity, lifestyle, and demographic characteristics. Cognitive status was assessed using the 12-item information/ orientation (I/O) subscale from the Clifton Assessment Procedures for the Elderly [28]. If any respondents scored less than 6, or scored 6-9 associated with evident anxiety, agitation or protracted response latencies, the interview was immediately discontinued. Physical health was assessed using a 13-item additive scale [25] (range 0-13) covering the presence or absence of: heart, stomach, eyesight, or foot problems; giddiness, headaches, urinary incontinence, arthritis, long-term disabilities and drug (excluding hypnotics) and walking aid use, and contact with (primary and secondary care) medical services (score of one for presence of each contributing factor).

Levels of customary physical activity (CPA) likely to promote muscle strength, joint flexibility, or stamina were assessed using detailed inventories, and are described in detail elsewhere [27]. In assessing walking, the interviewer asked in detail about walking activity on the day prior to interview and whether this was typical/ usual. If this day had been atypical, then another was selected (up to a maximum of six days previously). Walking (purposeful walking outside the house or garden) and shopping (i.e. continuous ambulatory behaviour associated with shopping) were assessed

separately. Both were scored as minutes per typical day. Regular walking as a leisure activity was also assessed, e.g., cross-country walking or rambling, walking the dog and social walking. In assessing walking as a leisure activity the interviewer first determined whether the respondent's participation in the activity met the criteria for 'customary', i.e., it took place with a frequency of at least once a week and had taken place for the previous eight weeks prior to interview, and then asked in detail about the frequency and duration of participation. Each reported activity was scored as minutes per week. Non-participation was scored as zero. For the purposes of analysis, the numbers of minutes per week for the three leisure-walking activities were combined.

Falls were assessed using the item "In the last year, have you fallen over?", with two response categories (yes/ no) [13]. A fall was classified as such if it occurred from an upright position (on his/her feet) and therefore falling while sitting was not included. Only those falls occurring in the previous year were recorded. If appropriate, respondents were then asked how many times they had fallen, the reason for the most recent fall and location of this fall (indoors or outdoors). The list of reasons for falling included: tripping, in which only the respondent was involved, e.g., slipping on ice, falling over furniture; accident, in which another person was involved, e.g., being knocked over in a crowd; dizziness; blackout; other problem). After completion of the interview anthropometric measurements were made of body weight, half-body span and maximum handgrip strength.

Estimating incidence

The at-risk group was defined as those people who were successfully re-interviewed in 1989 and who had not experienced a fall in the year prior to interview in 1985. New falls were defined as occurring to someone from the at-risk group in the year prior to interview in 1989. One-year incidence rates (expressed per 1000 person years at

risk) were estimated by calculating the total number of falls occurring in the year prior to interview and dividing this by the number of person years at risk.

Assessment of risk factors

Risk factors were assessed for the 4-year period to 1989 using baseline data collected in 1985. In order to maximise use of the available data and control for age and sex, odds ratios were computed using logistic regression, rather than case-control matching procedures. In order to assess the importance of walking-related activity in relation to incident falls a total of thirteen factors were included in the analyses. In addition to variables derived from assessments of walking activity, other potentially confounding factors were used as controls, including sociodemographic variables, health-related variables and anthropometric measurements. The thirteen variables measured in 1985 and included were: age group (two categories: age 65-74; age 75 and over), sex; social class (two categories: professional/intermediate/skilled; semiskilled/unskilled); physical health status (above/below the median health index score (=4)) [25], smoker status, whether housebound or not, number of prescribed drugs (increased risk per unit increase in number); body weight (two categories: underweight/average; overweight/obese according to the recommended body weight for stature); maximum handgrip strength (two categories: above/ below median handgrip strength for own sex); typical walking speed (two categories: non-ambulant/very slowly/stroll at easy pace; normal/fairly brisk/fast), total time spent walking for purposeful activity in minutes, time spent shopping in minutes, and the total time spent walking for relaxation. All thirteen factors were included in the initial logistic regression model and factors with a significance of greater than 0.1 were removed using a backwards stepwise (likelihood ratio) method. Three models were developed in the analyses: the first model included all non-fallers and fallers from the at-risk group; the

second model included only non-fallers and those people who fell indoors; and the third model included non-fallers and those people who fell outdoors. For each model, the odds of becoming a new faller at the first follow-up survey in 1989 were calculated in relation to assessments made in 1985 and compared with people who had not fallen in the year prior to interview in 1989.

Mortality following falls

Finally, relationships between falls and mortality were explored in two Cox regression models, in which age, gender, physical health status in 1985 and in 1989 and smoker status were controlled. Mortality was measured in terms of time in days until death or censorship in August 1997. In the first model four categories of fallers were used in the analysis (people who had not fallen; people who had fallen once; people who had fallen twice; and people who had fallen three or more times). Hazard rates were calculated for each category relative to those people who had not fallen. In the second model three categories of faller were used: people who had not fallen, people who had fallen indoors and people who had fallen outdoors. Hazard rates were calculated for people who had fallen indoors and those who had fallen outdoors, relative to those people who had not fallen. For both models, Kaplan-Meier cumulative survival curves were plotted against time until death or censorship.

Data were analysed using SPSS for Windows versions 6.0 and 7.5.1 [29].

Results

From the 690 survivors of the baseline survey 444 individuals (64.3%) reported no fall in 1985, and were therefore judged to be at-risk. The age-sex profile of this at-risk group is shown in Table 1.

Incidence of falls

Within the at-risk group 117 people (26.4%) experienced a fall in the year prior to follow-up in 1989. The total number of falls experienced by these people was 233, giving an overall incidence rate of 524.8 per 1000 person-years at risk (95% confidence intervals 473.3-576.3). Age-specific rates for men and women are shown in Table 1. The incidence rate for people aged 75 and over was 601.1 per 1000 person-years at risk (95% C.I. = 519.8-682.3) and was greater than for people aged less than 75 (468.8 per 1000 person-years at risk; 95% C.I. = 402.7-534.8) although there was overlap between the confidence intervals. The incidence rate was greater for women (601.7 per 1000 person-years at risk; 95% C.I. = 529.9-673.5) than for men (433.5 per 1000 person-years at risk; 95% C.I. = 360.8-506.2) and there was no overlap between the confidence intervals.

Number and location of falls

The total number of falls reported by fallers in the year preceding the interview in 1989 is shown in Table 2. There was no significant association between the number of falls and age grouping (χ^2_{trend} = 0.57, df = 1, p = 0.45) but there was a significant association between number of falls and gender (χ^2_{trend} = 4.81, df = 1, p = 0.03). Overall, 62.4% of fallers (n = 73) reported that the most recent fall was outdoors while 37.6% reported that it was indoors (n = 44). There was a significant association between location of fall and age grouping (χ^2 = 5.72, df = 1, p = 0.02). In the age group below the age of 75, 71.6% (n = 48) of the fallers fell outdoors compared with 50.0% of fallers (n = 25) in the group aged 75 years and over. There was no significant association between location of fall and gender (χ^2 = 2.82,

df = 1, p = 0.09). Among the men who fell, 71.7% (n = 33) fell outdoors compared with 56.3% among the women who fell (n = 40).

Reasons for falling

Table 3 compares the reasons given for falling with those reported for the original sample of fallers in the 1985 study of prevalent fallers [13]. The proportion of respondents who were unable to give a reason for their fall was 20.5%. Overall, 43.6% reported falls due to tripping, and 12.0% reported falls due to an accident (defined as an incident in which another person is also involved); 8.5% reported dizziness and 6.0% blackouts as the cause of their fall. Various other causes were given by the remaining 9.5%. No significant age or sex differences were found as to the reason for falling.

Risk factors for falls

A description of the variables measured in 1985 included in the logistic regression models is provided in Table 4 and 5. Univariate analyses showed that walking speed was associated with falling (χ^2 = 8.13, df = 1, $p < 0.005$). 32.9% (n = 54) of people who were non-ambulant or who could only walk very slowly or stroll at easy pace fell in the year prior to the 1989 interview, compared with 20.5% (n=53) of people who could walk at a normal/fairly brisk/fast speed. The risk factors remaining in the models are shown in Table 6 and a number of factors were associated with an increased risk of falling in 1989.

When people who fell were analysed in relation to people who did not fall, a person who was less healthy had a reduced risk of falling (odds ratio = 0.55; p = 0.05), a change in walking speed from the range normal/brisk/fast to stroll/very slow/non-ambulant had an odds ratio of 1.99 ($p < 0.01$) and for each increase in the number of prescribed drugs there was an increase in risk of falling of 1.30 (p = 0.01).

When people who fell indoors were analysed in relation to people who did not fall, it was found that a person who was less healthy had a reduced risk of falling (odds ratio = 0.30;

$p = 0.02$), a person who was housebound had an odds ratio of 4.94 ($p = 0.04$), a person with a maximum handgrip strength below the median for their sex had an odds ratio of 2.38 ($p = 0.03$) and a person with walking speed in the range stroll/very slow/non-ambulant compared with normal/brisk/fast to had an odds ratio of 3.27 ($p < 0.01$). The number of prescribed drugs was not significant ($p = 0.08$), although this attribute remained in the model.

When people who fell outdoors were analysed in relation to people who did not fall, it was found that for each increment in the number of prescribed drugs there was an increase in risk of falling of 1.30 ($p = 0.02$) and an increase in the number of hours per week a person spent walking for relaxation had an odds ratio of 1.09 ($p = 0.05$).

Survival after fall

Figure 1 shows the Kaplan-Meier eight-year survival curves for groups of people who had fallen a different number of times in the year prior to interview in 1989. There was no significant increase in the mortality for people who had fallen once ($p = 0.33$; n = 66) or twice ($p = 0.27$; n = 24) compared with those who had not fallen. There was a significant increase in mortality for people who had fallen three or more times (hazard ratio = 2.22; 95% confidence intervals = 1.37-3.61; $p = 0.003$; n = 26) compared with those who had not fallen.

Figure 2 shows the Kaplan-Meier eight-year survival curves for groups of people who had fallen in different locations in the year prior to interview in 1989. There was no significant increase in the mortality for people who had fallen outdoors ($p = 0.84$; n = 73) compared with those who had not fallen. There was a significant increase in mortality for people who had fallen indoors (hazard ratio = 1.71; 95% confidence intervals = 1.13-2.61; $p = 0.012$; n = 44) compared with those who had not fallen.

Discussion

The present longitudinal findings extend earlier cross-sectional analyses from the Nottingham study [13] and clarify, in particular, issues of falls incidence, the attributions of fallers, and risk factors for future falls. Each of these issues will be considered in turn.

Incidence

The overall incidence rate estimated here (524.8 per 1000 person-years at risk) compares favourably with previous studies [4,30], and the overall pattern of results, showing higher incidence among women and increased incidence with age, accords well with findings from other longitudinal surveys [30]. Converted to 'person years' estimates, for example, the incidence of 'new falls' in the present study is very similar to that reported by O'Loughlin *et al* [4] for community dwelling people aged 65 and over living in Canada (i.e. 496.8 per 1,000 person-years).

There are a number of features that may affect the findings of this study. First, given the long interval between the baseline measurements and follow-up interview, there is an unknown number of new fallers who may have died in these four years. Second, since the present study defined incident fallers as only those who reported falls in the year prior to interview in 1989, those within the at-risk group who may have fallen before this period, were excluded. And third, there is a recognised problem of under-reporting of falls associated with recall-based questionnaires [31]. However, given the representativeness of the original sample and the relatively high re-interview rates achieved in the present study, we feel that the results reported here offer valid and generalisable estimates of 'incident falls'. The levels of physical activity, medication use and general health may have changed over the four-year period between interview waves. Therefore, it cannot be assumed that the risk factors identified here would

necessarily be the same had they been assessed immediately prior to the period in which falls were measured. Nevertheless, the risk factors identified and discussed below, provide a useful insight into those attributes that are likely to increase the risk of falling in subsequent years among people who have not fallen previously.

Reasons for falling

The frequency distributions of reasons given for falling show a remarkable similarity between the cross-sectional (prevalent) and incident cases, with most falls attributed to tripping. Given the four-year period separating the two surveys and the exclusion of prevalent cases from the present sample, these distributions clearly indicate a uniform underlying causality for falls in later life. Furthermore, these results also offer evidence of consistency in the survey methodology at follow-up. The relatively high frequency of reasons for falls being attributed to extrinsic factors (over 55% of reasons due to tripping or accidents) rather than intrinsic factors (dizziness and blackouts accounted for less than 15% of reasons) support the idea that older people are vulnerable to environmental hazards, and that the risk of a person falling is increased by exposure to such hazards, and by a reduced capacity to respond to the consequent challenge to balance [1].

Risk factors and prognosis

The multivariate analyses of risk for all fallers (i.e. indoor and outdoor) provide a complex, and apparently contradictory, overview of falls aetiology, with prescribed medication, lower walking speed and better health all significantly and independently associated with incident falls. The decrease in risk of falling associated with poor health is contrary to reports described in two recent reviews [1,2]. It is possible, however, that the dichotomous (more healthy/less healthy) rating used in the present study did not provide a sensitive enough index of health variation. Another possible explanation is

that older people who have multiple health problems may have restricted activity that reduces the opportunities for falling (each member of the 'less healthy' group reported at least four symptoms or health problems). The use of prescribed medication, on the other hand, has consistently been described as a risk factor for falls [3,5,7,8,9,10,11,12,13,14,15,21], and clearly increased the risk of falling in the present study. From earlier analyses from this study [13] the overall number of drugs prescribed appears to provide a relatively sensitive index of general health in later life. When considered in relation to the reduced risk associated with impaired health, these findings suggest a non-linear relationship between health and falls in later life. Poorer health may have increased falls risk among the most mobile, while falls risk may have been reduced among people whose poor health resulted in restricted activity or mobility. The possible existence of a non-linear health-falls relationship mediated by activity level is consistent with the present findings on walking speed, physical strength, and the location (indoor/outdoor) of reported falls. Slower walking speed has previously been reported as a risk factor for hip fractures resulting from falls [11], and balance and gait impairment have been identified as risk factors for falls in older people living in the community [32,33] and in long-term institutional care [34]. Slower walking speed may also be acting as a proxy for poor health amongst older people so that less healthy, but still active, people, are exposed both to intrinsic factors associated with falls and also to environmental hazards.

When analysed separately, indoor falls were significantly associated with being housebound and having a lower maximum handgrip strength, both indicative of ill health and possible frailty. The relatively poorer health status of indoor fallers is strongly suggested by the survival analyses which showed that people who had fallen indoors had increased mortality compared with those people who had not fallen. In

contrast, the risk of outdoor falls increased in relation to higher levels of prescribed medication and walking for relaxation, again suggestive of poor health but of maintained mobility/ activity. This association between walking for relaxation and increased risk of experiencing a fall outdoors has not previously been reported, although walking more than three blocks per day has been associated with decreased risk of fall and with an increased risk of serious fall injury, but not at a level of statistical significance [32]. The association of walking for relaxation with increased risk of falling suggests increased exposure to environmental hazards and to opportunities for falling.

Overall, these results are consistent with the conclusion of there being important differences between indoor and outdoor falls among older people. On the one hand, people who are housebound and frail are at risk of falling indoors, due to intrinsic factors. On the other hand, older people who have some degree of activity, but may also be frail, are exposed both to intrinsic factors and to the opportunity of falling or environmental hazards, and are at risk from falling outdoors. Furthermore, people who fall indoors have increased mortality although the causal relationship between frailty, falling indoors and mortality requires further elucidation. These results emphasise the complex nature of the interaction between intrinsic and extrinsic factors associated with falling [1] and add weight to the argument that indoor and outdoor falls should be studied separately [35].

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Table 1: 1-year incidence rates of new falls per 1000 person-years at risk.

	Population at risk	Number of incident fallers in 1989	Number of falls	Incidence rate per 1000 person-years at risk	95% confidence intervals
Overall	444	117 (26.4)	233	524.8	473.3-576.3
By age					
<75	256	67 (26.2)	120	468.8	402.7-534.8
75+	188	50 (26.6)	113	601.1	519.8-682.3
By sex:					
Male	203	46 (22.7)	88	433.5	360.8-506.2
Female	241	71 (29.6)	145	601.7	529.9-673.5
By age and sex:					
Male <75	130	33 (25.4)	54	415.4	325.6-505.1
Male 75+	73	13 (17.8)	34	465.8	342.3-589.2
Female <75	126	36 (28.6)	66	523.8	427.2-620.5
Female 75+	115	35 (30.4)	79	687.0	581.1-792.9

Table 2: Reported frequency (percentage) of falls within the at-risk group according to age and sex. (Data for one faller missing).

	Frequency of fall				
	No falls	Fell once	Fell twice	Fell three or more times	Total
Overall	328 (73.5)	66 (15.1)	24 (5.5)	26 (5.9)	444
By age:					
<75 years	189 (73.6)	42 (16.5)	12 (4.7)	13 (5.1)	256
75+ years	139 (73.2)	24 (13.1)	12 (6.6)	13 (7.1)	188
By sex:					
Male	158 (77.6)	29 (14.4)	8 (4.0)	8 (4.0)	203
Female	170 (69.9)	37 (15.7)	16 (6.8)	18 (7.6)	241

Table 3: Reasons given for most recent fall by individuals who reported one or more falls in the previous year: number (percentage) comparison between the 1985 prevalent fallers and the 1989 incident fallers.

Reason	1989 incident fallers (n = 117)	1985 prevalent fallers (n = 278)
Don't know	24 (20.5)	53 (19.3)
Tripped	51 (43.6)	147 (53.3)
Accident	14 (12.0)	14 (5.2)
Dizziness	10 (8.5)	22 (7.8)
Blackout	7 (6.0)	18 (6.4)
Other	11 (9.5)	24 (8.0)

Table 4: Description of categorical variables included in logistic regression models[a].

Variable (*n* missing)	Category	Frequency	*N* fallers (%)
Social class (7)	Professional/intermediate/skilled	327	85 (26.2)
	Semiskilled/unskilled	115	31 (27.4)
Smoking status (7)	Non-smoker	333	91 (27.3)
	Current smoker	104	25 (24.0)
Housebound (7)	Yes	10	5 (50.0)
	No	437	111 (26.5)
Walking speed (22)	Normal/fairly brisk/fast	258	53 (20.5)[b]
	Non-ambulant/very slowly/stroll at easy pace	164	54 (32.9)
Weight (10)	Underweight/ average	265	64 (24.2)
	Overweight/ obese	169	50 (29.6)
Health (9)	< median health index score (≤3)	233	59 (25.3)
	≥ median health index score (≥4)	202	56 (27.7)
Handgrip strength (20)	< max. recorded handgrip strength for sex	210	62 (29.5)
	≥ max. recorded handgrip strength for sex	214	48 (22.4)

[a] for descriptives of age group and sex see Table 1.

[b] $p<0.005$

Table 5: Description of continuous variables included in logistic regression models[a].

Variable	Median	Interquartile range
Minutes walking for purposeful activity	30	0,75
Minutes shopping	0	0,30
Total minutes walking for leisure activity	0	0,90
Number of prescribed drugs	1	0,2

Table 6: Risk factors for incident falls.

Category of faller	Risk factor	Odds ratio	95% confidence intervals	Significance
All	Health category[a]	0.55	0.31-1.00	0.05
	Number of prescribed drugs[b]	1.30	1.06-1.59	0.01
	Walking speed[c]	1.99	1.18-3.35	0.01
Indoors fallers:	Health category[a]	0.30	0.11-0.83	0.02
	Being housebound[d]	4.94	1.08-22.70	0.04
	Maximum handgrip strength[e]	2.38	1.07-5.29	0.03
	Number of prescribed drugs[b]	1.33	0.96-1.82	0.08
	Walking speed[c]	3.27	1.38-4.13	0.01
Outdoors fallers:	Number of prescribed drugs[b]	1.29	1.05-1.59	0.02
	Total walking for relaxation[f]	1.09	1.00-1.20	0.05

Odds ratios associated with:

[a]change from below median health index score relative to above median health index score.

[b]increase in the number of prescribed drugs

[c]change in walking speed from the range normal/brisk/fast to stroll/very slow/non-ambulant

[d] relative to not being housebound

[e] maximum handgrip strength below the median for their sex relative to above median for their sex.

[f] change per increase in number of hours per week a person spent walking for relaxation

Figure 1: Survival function for at-risk group according to number of falls reported in 1989.

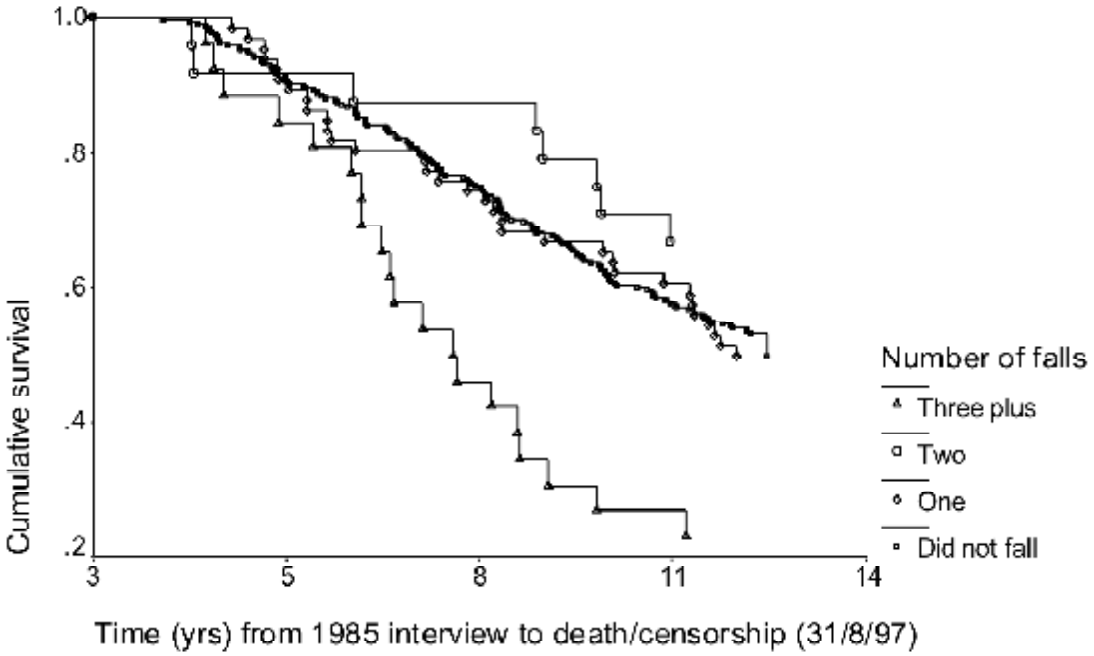

Figure 2: Survival function for at-risk group according to location of fall reported in 1989.