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# Prevalence and correlates of fear of falling, and associated avoidance of activity in the general population of community-living older people

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## Abstract

**Background:** little is known about the prevalence rates and correlates of fear of falling and avoidance of activity due to fear of falling in the general population of community-living older people.
**Objective:** to assess prevalence rates and study correlates of fear of falling and avoidance of activity due to fear of falling in this population.
**Study design and setting:** cross-sectional study in 4,031 community-living people aged ≥70 years.
**Results:** fear of falling was reported by 54.3% and associated avoidance of activity by 37.9% of our population. Variables independently associated with fear of falling were: higher age (≥80 years: odds ratio (OR) = 1.79; 95% confidence interval (CI) = 1.49–2.16), female gender (OR = 3.23; 95% CI = 2.76–3.79), poor perceived general health (OR = 6.93; 95% CI = 4.70–10.21) and multiple falls (OR = 5.72; 95% CI = 4.40–7.43). Higher age (≥80 years: OR = 1.92; 95% CI = 1.59–2.32), poor perceived general health (OR = 11.91; 95% CI = 8.38–16.95) and multiple falls (OR = 4.64; 95% CI = 3.73–5.76) were also independently associated with avoidance of activity.
**Conclusions:** fear of falling and avoidance of activities due to fear of falling, were highly prevalent in our sample of community-living older people. Particularly, poor perceived general health showed a strong, independent association with both, fear of falling, and related avoidance of activity. Findings of our study may help health care professionals to identify people eligible for interventions aimed at reducing fear of falling and activity restriction.

Keywords: *aged, correlates, fear of falling, daily activity, cross-sectional, elderly*

## Background

Fear of falling and avoidance of activity due to fear of falling are common in older people, both in fallers and non-fallers [1–3]. In community-living older people, the prevalence rates for fear of falling range from 20 to 85% [1–15] and from 15 to 55% [1, 2, 10, 15] for associated avoidance of activity. Fear of falling, and associated avoidance of activity may lead to adverse consequences, like functional decline [7], restriction of social participation [2], decreased quality of life [3, 7] and increased risk of falling [10] and institutionalisation [7]. Fear of falling is suggested to be a potential health problem of equal importance to a fall [7] and may also affect society as health care utilisation and costs increase. This underlines the need to study the prevalence of fear of falling and associated avoidance of

activity, and to identify those fearful and avoidant older people in order to facilitate recommendation of prevention strategies.

Current literature on fear of falling and associated avoidance of activity shows several limitations. First, prevalence rates are often based on samples of community-living older people, yet most of these samples do not represent the *general* population of community-living older people [2, 6, 14–16]. In addition, in most studies, prevalence according to subgroups could not be studied due to relatively small subgroups. Second, factors independently related to fear of falling and particularly for avoidance of activity due to fear of falling are understudied. To identify the appropriate population for prevention strategies knowledge of these factors is important.

This cross-sectional study was performed in a random sample of the general population of community-living older people in The Netherlands and aimed to: (a) assess the prevalence of fear of falling and avoidance of activity due to fear of falling, and (b) study correlates of fear of falling and avoidance of activity due to this fear.

## Methods

Study participants were older people living in two urban areas in The Netherlands. Between November 2002 and July 2003, local municipal registry offices selected a random sample of 7,431 community-living people aged ≥70 years. Selected persons received a short, posted questionnaire. If the questionnaire was not returned in a fortnight, a reminder to return the questionnaire was sent. This study was approved by the Medical Ethics Committee of Maastricht University/Academic Hospital, Maastricht [17].

The questionnaire assessed fear of falling (Are you afraid of falling?) and associated avoidance of activity (Do you avoid certain activities due to fear of falling?). Participants indicated the frequency (never, almost never, sometimes, often or very often) of experiencing this fear or avoiding activities. For the analyses in which fear of falling and associated avoidance of activity (as of here called avoidance of activity) were applied as dependent variables, this frequency was dichotomised (sometimes, often and very often versus almost never and never). In addition, several socio-demographic and health-related variables were assessed: age (aged 70–74, 75–79 or ≥80 years), gender (male and female), living situation (alone and not alone), educational level based on completed education and completed professional courses during lifetime (low, middle and high) [18, 19], perceived general health [20, 21] (good, fair and poor) and falls in the past 6 months (never, once and more than once).

### Statistical methods

To test for differences in age and gender between non-responders and responders to the questionnaire, the Mann–Whitney test statistic and chi-square test, respectively, were used. Next, two sets of univariate analyses were performed using chi-square tests. First, analyses were performed to identify associations between fear of falling and socio-demographic and health-related variables. Second, similar analyses were performed with avoidance of activity instead of fear of falling. Lastly, three series of multivariate logistic regression analyses were performed. First, an analysis was performed to test which of the socio-demographic and health-related variables was independently associated with fear of falling (model 1). Second, a similar strategy was applied for avoidance of activity instead of fear of falling (model 2). Third, an analysis was performed to study the association of these variables with avoidance of activity, independent of the measurement of fear of falling (model 3). For this purpose, fear of falling, which may be considered as a mediator between the selected variables and avoidance of activity, was added to model 2. Those participants reporting they were never afraid of falling were excluded from this analysis, as avoidance of activity due to fear of falling is not applicable to these participants. All socio-demographic and health-related variables were included in the three models, since $P$ values of ≤.01 were obtained at the univariate analyses for the appropriate dependent variables. Odds ratios (OR) and 95% confidence intervals (CI) were calculated.

All analyses were conducted using SPSS for Windows version 12.0 (SPSS, Inc. Chicago, IL).

## Results

Of the 7,431 older people who were approached, 4,376 responded to the questionnaire (response rate 58.9%). A total of 4,031 questionnaires were included in the analyses since 345 were incomplete. Non-responders and those excluded ($n$ = 3,400) differed significantly from responders regarding age (mean age 78.1, standard deviation (SD) = 5.5 versus mean age 77.1, SD = 4.9; $P$<0.01) and gender (46.8% versus 53.2% female; $P$ = 0.02).

Table 1 summarises participants' characteristics and correlates of fear of falling and avoidance of activity. Of the participants, 39.8% were aged 70–74 years, 40.1% were males, 44.0% lived alone and 60.7% had a low educational level. Over half of the participants rated their general health as good and 67.4% reported no falls in the past 6 months.

Prevalence rates for fear of falling and avoidance of activity are presented in Table 2. In total, 54.3% of the participants reported fear of falling (sometimes, often and very often) and 37.9% reported avoidance of activity (sometimes, often and very often). Of those experiencing fear of falling, two-thirds (65.5%) reported avoiding activities due to this fear (data not shown).

The univariate analyses (see Table 1) showed that all socio-demographic and health-related variables were associated with both fear of falling and avoidance of activity.

Table 3 presents multivariate associations between fear of falling and avoidance of activity, and socio-demographic and health-related variables. Significant independent associations with experiencing fear of falling and avoidance of activity were found for: higher age, female gender, worsened perceived general health and increased number of falls.

Table 1. Participants' characteristics and correlates of fear of falling and avoidance of activity in community-living older people ($n = 4,031$)[a]

| Variables | Number (%) | | Fear of falling, (%)[b] Yes | Fear of falling, (%)[b] No | Avoidance of activity, (%)[b] Yes | Avoidance of activity, (%)[b] No |
|---|---|---|---|---|---|---|
| Age | | | | | | |
| 70–74 years | 1,606 | (39.8) | 45.8 | 54.2 | 29.9 | 70.1 |
| 75–79 years | 1,357 | (33.7) | 55.2 | 44.8 | 37.7 | 62.3 |
| ≥80 years | 1,068 | (26.5) | 65.6 | 34.4 | 50.5 | 49.5 |
| Gender | | | | | | |
| Male | 1,615 | (40.1) | 37.0 | 63.0 | 25.8 | 74.2 |
| Female | 2,416 | (59.9) | 65.7 | 34.3 | 46.1 | 53.9 |
| Living situation | | | | | | |
| Alone | 1,774 | (44.0) | 62.2 | 37.8 | 44.5 | 55.5 |
| Not alone | 2,257 | (56.0) | 48.0 | 52.0 | 32.8 | 67.2 |
| Educational level | | | | | | |
| Low | 2,447 | (60.7) | 58.9 | 41.1 | 43.2 | 56.8 |
| Middle | 1,016 | (25.2) | 47.9 | 52.1 | 30.3 | 69.7 |
| High | 568 | (14.1) | 45.4 | 54.6 | 29.0 | 71.0 |
| Perceived general health | | | | | | |
| Good | 2,116 | (52.5) | 38.8 | 61.2 | 19.7 | 80.3 |
| Fair | 1,703 | (42.2) | 69.9 | 30.1 | 56.0 | 44.0 |
| Poor | 212 | (5.3) | 82.1 | 17.9 | 75.5 | 24.5 |
| Falls in the past 6 months | | | | | | |
| Never | 2,716 | (67.4) | 43.8 | 56.2 | 28.5 | 71.5 |
| Once | 703 | (17.4) | 66.3 | 33.7 | 43.4 | 56.6 |
| More than once | 612 | (15.2) | 86.8 | 13.2 | 73.7 | 26.3 |

[a] chi-square tests were used to study univariate associations between fear of falling and avoidance of activity due to fear of falling, and socio-demographic and health-related variables; all $P$ values were <0.01.

[b] 'Yes' indicates sometimes, often or very often experiencing fear of falling or avoidance of activity due to fear of falling. 'No' indicates almost never or never experiencing fear of falling or avoidance of activity due to fear of falling.

Table 2. Prevalence of fear of falling and avoidance of activity in community-living older people ($n = 4,031$)

| | Fear of falling number (%) | | Avoidance of activity number (%) | |
|---|---|---|---|---|
| Very often | 216 | (5.4) | 193 | (4.8) |
| Often | 407 | (10.1) | 396 | (9.8) |
| Sometimes | 1,563 | (38.8) | 941 | (23.3) |
| Almost never | 746 | (18.5) | 600 | (14.9) |
| Never | 1,099 | (27.3) | 1,901 | (47.2) |

For example, for fear of falling (model 1), compared to participants aged 70–74 years, those aged 75–79 were 40% more likely to experience fear of falling (OR = 1.40; 95% CI = 1.18–1.65) and compared to men, women were over three times as likely to experience fear of falling (OR = 3.23; 95% CI = 2.76–3.79). For example, for avoidance of activity (model 2), compared to those indicating their general health as good, those indicating their general health as poor were nearly twelve times as likely to avoid activities (OR = 11.91; 95% CI = 8.38–16.95) and compared to those who had not fallen, those who had fallen more than once were over four times (OR = 4.64; 95% CI = 3.73–5.76) as likely to avoid activities. Living situation and educational level were not independently associated with fear of falling or avoidance of activity.

When fear of falling was added as an additional variable (model 3; Table 3), odds ratios of all variables that showed significance in model 2 decreased. Nevertheless, the association for the highest age group (≥80 years), fair and poor perceived general health and multiple falls with avoidance of activities remained statistically significant.

## Discussion

In our sample of 4,031 older people randomly selected from the general population of community-living older people, 54% reported fear of falling and 38% reported avoiding activity due to fear of falling. These prevalence rates are comparable to prevalence rates reported in several studies [1, 6, 8, 10–12, 14]. Some studies, however, reported either lower or higher prevalence rates [2–5, 7, 13, 15]. Variations in prevalence rates may be due to differences in population characteristics, like age, fall history and frailty, and applied measures [10, 14].

**Table 3.** Multivariate associations between fear of falling and avoidance of activity and socio-demographic and health-related variables in community-living older people[a]

| Variables | Odds ratio (95% confidence Interval) Model 1 Fear of falling as dependent variable ($n = 4,031$) | | Model 2 Avoidance of activity as dependent variable ($n = 4,031$) | | Model 3 Avoidance of activity as dependent variable[b] ($n = 2,932$) | |
|---|---|---|---|---|---|---|
| Age | | | | | | |
| 70–74 years | 1.00 | (Reference) | 1.00 | (Reference) | 1.00 | (Reference) |
| 75–79 years | 1.40 | (1.18–1.65) | 1.30 | (1.09–1.56) | 1.14 | (0.92–1.41) |
| ≥80 years | 1.79 | (1.49–2.16) | 1.92 | (1.59–2.32) | 1.56 | (1.24–1.95) |
| Gender | | | | | | |
| Male | 1.00 | (Reference) | 1.00 | (Reference) | 1.00 | (Reference) |
| Female | 3.23 | (2.76–3.79) | 2.27 | (1.92–2.69) | 1.05 | (0.85–1.29) |
| Living situation | | | | | | |
| Alone | 1.00 | (Reference) | 1.00 | (Reference) | 1.00 | (Reference) |
| Not alone | 0.93 | (0.79–1.08) | 0.92 | (0.79–1.08) | 0.98 | (0.81–1.18) |
| Educational level | | | | | | |
| Low | 1.00 | (Reference) | 1.00 | (Reference) | 1.00 | (Reference) |
| Middle | 1.05 | (0.88–1.24) | 0.87 | (0.73–1.05) | 0.74 | (0.60–0.93) |
| High | 1.04 | (0.84–1.29) | 0.88 | (0.70–1.11) | 0.72 | (0.54–0.95) |
| Perceived general health | | | | | | |
| Good | 1.00 | (Reference) | 1.00 | (Reference) | 1.00 | (Reference) |
| Fair | 3.19 | (2.75–3.71) | 4.42 | (3.79–5.15) | 2.92 | (2.43–3.52) |
| Poor | 6.93 | (4.70–10.21) | 11.91 | (8.38–16.95) | 5.70 | (3.57–9.12) |
| Falls in the past 6 months | | | | | | |
| Never | 1.00 | (Reference) | 1.00 | (Reference) | 1.00 | (Reference) |
| Once | 2.28 | (1.89–2.75) | 1.69 | (1.40–2.04) | 1.09 | (0.87–1.36) |
| More than once | 5.72 | (4.40–7.43) | 4.64 | (3.73–5.76) | 1.97 | (1.52–2.54) |
| Fear of falling | | | | | | |
| Almost never | | | | | 1.00 | (Reference) |
| Sometimes | | | | | 7.15 | (5.59–9.13) |
| Often | | | | | 24.61 | (17.02–35.59) |
| Very often | | | | | 63.61 | (33.63–120.32) |

*Note:* All variables were entered simultaneously into each multivariate logistic regression model.

[a] The dependent variables 'fear of falling' and 'avoidance of activity', comprise participants reporting sometimes, often and very often experiencing fear of falling or avoidance of activity due to fear of falling.

[b] The measurement of fear of falling was added to this model.

With regard to identifying variables related to fear of falling, the variables we found to be univariately associated with this fear correspond to those reported by Arfken *et al.* [3] and Howland *et al.* [6]: higher age, female gender, fair and poor perceived general health, and having experienced one or more falls. In our multivariate analysis, the independent association between these variables and fear of falling remained. Arfken *et al.* [3] showed similar results, but Howland *et al.* [6] only found female gender and falls to be independently related to fear of falling. These latter findings were supported in a study among community-living older people using home care services [14]. In another study among community-living older females contacted for participation in a hip protector trial, living alone, poor general health and history of falling showed to be associated with fear of fallings; however, higher age was not associated with fear of falling [22]. In accordance with our findings, living situation and educational level were not associated with experiencing fear of falling in other studies [2, 6–8]. Thus, the evidence for female gender, fair and poor perceived general health, and falls as independent correlates of fear of falling appears strong, while living situation and education level should not be regarded as factors independently related to fear of falling.

With regard to identifying variables independently related to avoidance of activity, we found significant associations with higher age, female gender, fair and poor perceived general health and multiple falls. Particularly, fair and poor perceived general health and multiple falls were strongly associated with avoidance of activity. Educational level and living situation were not associated with avoidance of activity when other variables were taken into account. Regarding female gender, poor self-rated health and multiple falls as correlates of avoidance of activity, our results correspond with previous findings [14]; however, they do not correspond with results in several other studies [6, 11, 23]. These variations in findings may be explained by differences in population characteristics or settings. Our results correspond to previous findings in that living situation and educational level were not independently associated with avoidance of activity and add that higher age may be regarded as a factor

independently related to avoidance of activity in community-living older people.

Our findings regarding avoidance of activity remained fairly similar when fear of falling was entered into the logistic model. Although sometimes, often and very often experiencing fear of falling were strongly associated with avoidance of activity, higher age (≥80 years), fair and poor perceived health and multiple falls remained independently associated with avoidance of activity in community-living older people. This implies that interventions aimed at reducing avoidance of activity should not focus on fear of falling alone, but on other modifiable factors, like falls, as well.

There are limitations that may have affected the results of our study. First, although we approached a representative sample of the general population of community-living older people, about 40% did not respond to the questionnaire. Non-responders showed to be slightly older than responders and were more likely to be female. Consequently, our prevalence rates may be somewhat underestimated as our study showed that fear of falling and avoidance of activity are more common in people of high age and female gender. Due to strict policies of municipal registry offices regarding people's privacy, no additional contact with non-responders of our study was permitted. However, if permitted, we recommend non-response research in future studies to gain insight into non-responders regarding general characteristics and levels of fear of falling and avoidance of activity. We expect the impact of our non-response on the correlates of fear of falling and avoidance of activity to be limited not only as our associations showed to be similar to those in other studies but also as the impact of non-response on studied associations showed to be quite small [24]. Second, prevalence rates of fear of falling and avoidance of activity may also have been under-reported since reluctance to acknowledge fear of falling among older people has been observed [12, 25]. Third, we assessed both fear of falling and avoidance of activity with a one-item question, which may not be the most optimal way to measure a construct. The one-item fear of falling question, however, has been found to correlate significantly with the Falls Efficacy Scale International [26], a 16-item measure that assesses one's concern regarding falls in both easy and more complex physical and social activities [27]. Lastly, like other cross-sectional studies, the design of our study limits interpretation of the results with regard to causality between particularly health-related variables on the one hand and fear of falling or avoidance of activity on the other. In a prospective study [10], fear of falling showed to be an independent predictor for falls and vice versa. It seems plausible that this might also apply to avoidance of activity, and, in addition, to both fear of falling and avoidance of activity and perceived general health. Further research is warranted to study the causal relationship between fear of falling or avoidance of activity and perceived general health.

This study has several strengths as well. First, our study population was randomly selected from the general population of community-living older people. Furthermore, the large sample of our study enabled us to create substantial subgroups for the different socio-demographic and health-related variables. Finally, our findings are important for practice, they may help health care professionals recognise fear of falling and avoidance of activity in older people.

In conclusion, our study shows that fear of falling and avoidance of activity are highly prevalent among community-living older people in The Netherlands. The independent associations found in this large sample support several findings in other studies. Particularly, strong associations were found for fair and poor perceived general health and multiple falls with fear of falling and associated avoidance of activity. Our study adds the new insight that higher age also showed to be independently related to avoidance of activity. It also adds that both fair and poor perceived general health and multiple falls in the past six months may be important modifiable factors that, independently from fear of falling, may need to be taken into consideration when aiming to reduce avoidance of activity. The findings of the current study are important for prevention purposes and may help health care professionals to identify people at risk for fear of falling and associated avoidance of activity. Healthcare professionals are vital links in the process of recognising fearful and avoidant older people and referring them to interventions. We therefore recommend they inquire after fear of falling and associated avoidance of activity in patients at risk, for instance, patients in poor health. Subsequently, fearful and avoidant persons could be referred to interventions aimed at reducing fear of falling and increasing activity, such as a cognitive behavioural intervention [28], a taichi intervention [29] or a home-based exercise intervention [30] for community-living older people.

## Key points

- Little is known about the prevalence and correlates of fear of falling and avoidance of activity in the general population of community-living older people.
- Our findings in a random sample of 4,031 older people show that fear of falling and associated avoidance of activity are highly present in the general population of community-living older people.
- Higher age, female gender, fair or poor perceived general health and one or multiple falls were independently associated with fear of falling and associated avoidance of activity. Particularly, the associations for fair and poor perceived health and multiple falls were very strong.

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### Conflicts of Interest

The authors declare no conflicts of interest.

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