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# Prospective Study of the Impact of Fear of Falling on Activities of Daily Living, SF-36 Scores, and Nursing Home Admission

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***Background.*** The aim of this study was to assess the impact of fear of falling on the health of older people.

***Methods.*** A total of 528 subjects (mean age 77 years) were recruited from two hospitals in Sydney, Australia, and followed for approximately 12 months. Eighty-five subjects died during follow-up, and 31 were admitted to an aged care institution. Tinetti's Falls Efficacy Scale (FES) was successfully administered to 418 subjects as part of the baseline assessment. Among those with baseline FES scores, ability to perform 10 activities of daily living (ADLs) was assessed at baseline and follow-up in 307 subjects, and SF-36 scores were assessed at baseline and follow-up in 90 subjects recruited during the latter part of the study. Falls during follow-up were identified using a monthly falls calendar.

***Results.*** Compared with those with a high fall-related self-efficacy (FES score = 100), those with a low fall-related self-efficacy (FES score $\leq$ 75) had an increased risk of falling (adjusted relative risk 2.09, 95% confidence interval [CI] 1.31–3.33). Those with poorer fall-related self-efficacy had greater declines in ability to perform ADLs ($p < .001$): the total ADL score decreased by 0.69 activities among persons with low FES scores ($\leq$75) but decreased by only 0.04 activities among persons with FES scores of 100. Decline in ADLs was not explained by the higher frequency of falls among persons with low FES scores. SF-36 scores (particularly scores on the Physical Function and Bodily Pain subscales) tended to decline more among persons with poor fall-related self-efficacy. Nonfallers who said they were afraid of falling had an increased risk of admission to an aged care institution.

***Conclusions.*** Fear of falling has serious consequences for older people. Interventions that successfully reduce fear of falling and improve fall-related self-efficacy are likely to have major health benefits.

FEAR of falling has been considered a health problem among older people ever since Murphy and Isaacs' now classic description of the post-fall syndrome (1). This fear can be assessed with a single question: "Are you afraid of falling?" Studies using this type of approach have found that persons who are afraid of falling tend to have a history of falling, do poorly on tests of gait and balance, have poor vision, need assistance with activities of daily living (ADLs), and rate their health as poor (2–6). The Falls Efficacy Scale (FES), developed by Tinetti and coworkers, extends the concept of fear of falling by assessing fall-related self-efficacy (7). The FES assesses an older person's confidence in performing a series of everyday tasks without falling. In a cross-sectional study, Tinetti and coworkers found that low scores on the FES were strongly associated with poor physical and social function (8).

Most research on fear of falling has been cross-sectional, with fear of falling and various measures of health status assessed at the same time. The obvious problem with this type of research is that it is impossible to determine the directionality of any observed associations: did fear of falling cause the poor health, or vice versa? To our knowledge, there have been only two relevant prospective studies published to date (4,9). Vellas and coworkers found that persons who fell and were worried about falling again were more likely to show declines in gait and balance over a 2-year follow-up period than fallers who were not worried about falling again (4). More recently, Mendes de Leon and coworkers found that low fall-related self-efficacy was associated with a decline in ability to perform ADLs (9).

In this paper, we present results from a prospective investigation of the relationship between being afraid of falling and low fall-related self-efficacy and risk of future falls, admission to an aged care institution, deterioration in ability to perform ADLs, and deterioration in health-related quality of life.

## Methods

The data used in this paper were collected during a randomized trial of an occupational therapy intervention for falls prevention. The randomized trial is described in detail elsewhere (10).

### *Subject Recruitment*

Subjects were recruited in Sydney, Australia, between June 1995 and January 1997. Most subjects were recruited while inpatients in selected wards at Royal Prince Alfred Hospital (a major teaching hospital) or Balmain Hospital (a rehabilitation hospital)—the respiratory (25% of subjects), geriatric (22%), gastroenterology (14%), general medical (12%), and eye (11%) wards. Wards were chosen if they had a high proportion of elderly patients and if ward staff were willing to assist in subject recruitment by identifying patients they thought might be suitable. Nine percent of all patients aged 65 years and older admitted to these wards during the study period were recruited into our study. The mean age of study subjects was the same as for all admitted patients 65 years and older (76.1 years), but subjects were more likely to be female (57%, compared with 52%). Some subjects were recruited from outpatient clinics at the two study hospitals (5% of subjects) and from local day care centers for older people (11%).

Subjects were eligible for inclusion if they were aged 65 years or more and lived in the community (not a nursing home or hostel for the aged) in the Central Sydney Area Health Service region. Persons with cognitive impairment were included as long as they lived with someone who was able to give informed consent and who could report on falls during follow-up. Inpatients were excluded if a home visit by an occupational therapist was planned as part of their usual care.

All subjects (or their caregivers) gave written informed consent, and the study was approved by the Ethics Review Committee of the Central Sydney Area Health Service.

### *Baseline Interview*

Baseline data were collected using an interviewer-administered questionnaire. These data included sociodemographic details, a brief medical history, current medications, self-reported problems with vision, use of community services, history of falls in the past 12 months, ADLs, and fall-related self-efficacy.

ADLs were assessed with the Spector-Katz Index (11) and Smith's modification of the Rosow-Breslau Health Scale (12). These two ADL scales contain a total of 10 questions, each asking whether subjects needed help to complete a particular activity. The 10 activities are bathing, grooming, dressing, eating, transferring from a bed to a chair, using a toilet, walking across a room, walking half a mile, doing heavy housework, and walking up and down stairs to the first floor. Responses were scored 0 or 1 and summed to give a total ADL score from 0 (no problem with ADLs) to 10 (major problems with ADLs).

All 528 subjects answered the question "Are you afraid of falling?" Four hundred and eighteen subjects (79%) also completed Tinetti's Falls Efficacy Scale (FES), which was used to assess fall-related self-efficacy (7). This is a 10-question scale that assesses the impact of fear of falling on a person's confidence to perform everyday tasks. An example of a question is "How confident are you that you can clean the house without falling?" Subjects rate each question on a scale of 0 to 10, and the scores are summed to give a total score between 0 (low fall-related self-efficacy) and 100 (high fall-related self-efficacy). The FES has good internal consistency ($\alpha = .91$), test–retest reliability ($r = .71$), and construct validity (7). We use *fear of falling* as a general term to describe both low fall-related self-efficacy and being afraid of falling.

All subjects recruited after July 1996 ($n = 212$) were asked to complete the SF-36 health-related quality of life questionnaire (13). The SF-36 produces scores on eight subscales (Bodily Pain, General Health Perceptions, Mental Health, Physical Function, Role Physical, Role Emotional, Social Function, and Vitality) as well as two summary scales (the Physical Component Scale and the Mental Component Scale).

### *Follow-up*

Falls during follow-up were ascertained with a set of monthly falls calendars, which subjects were asked to fill in each day and return by mail to the study center at the end of each month. Subjects were asked to write F on the calendar if they had a fall on that day and N if they did not fall. Subjects who had not returned a calendar within 10 days of the end of the month were telephoned and asked about falls in the previous month. Subjects provided data on falls for 12 months or until they died ($n = 85$), moved into an aged care institution ($n = 31$), or were asked to withdraw from the study ($n = 25$), whichever came first. Data on falls from calendars or telephone calls were collected for >97% of the person-months of follow-up.

Twelve-month follow-up interviews in the home were conducted if subjects were still living in the community. The interviewer-administered follow-up questionnaire included many of the same questions as the baseline interview.

### *Numbers of Subjects Available for Statistical Analyses*

Analyses were conducted for four separate outcome variables: falls during follow-up, admission to an aged care institution, change in ADL scores between baseline and follow-up, and change in SF-36 scores between baseline and follow-up. The predictor variables were baseline FES scores and answers to the question "Are you afraid of falling?" Analyses with falls or admission to an aged care institution as outcomes involved all subjects with baseline data on predictor variables (528 subjects for "Are you afraid of falling?" and 418 for FES scores).

Fewer subjects were available for analyses of change in ADL and SF-36 scores. Of the 418 subjects with baseline FES scores, 307 were included in analyses of change in ADL scores. Causes of missing data were no baseline ADL score ($n = 6$), death ($n = 59$), admission to an aged care institution ($n = 24$), withdrawing from the study for other reasons ($n = 19$), and no follow-up ADL data collected at home visit ($n = 3$). SF-36 data were collected from only the last 212 subjects recruited into the study; 131 of these subjects (62%) had baseline FES scores. Ninety of these 131 subjects were included in analyses of changes in SF-36 scores. Causes of missing data were death ($n = 14$), admission to an aged care institution ($n = 7$), withdrawing from study for other reasons ($n = 10$), and no follow-up SF-36 data collected at home visit ($n = 10$).

### *Statistical Methods*

FES scores were highly skewed, with 33% of subjects scoring 100. This distribution could not be normalized through any data transformation. Hence, we divided subjects into three FES categories: ≤75 ($n = 88$), 76–99 ($n = 190$), and 100 ($n = 140$). These same categories have been used by others (9).

The statistical significance of associations at baseline between fear of falling and sociodemographic and health-related characteristics was assessed using analysis of variance (continuous characteristics) and chi-square tests (categorical characteristics).

The association between falls during follow-up and baseline FES scores (three categories) and being afraid of falling (yes/no) were investigated using Cox proportional hazards models with time to first fall as the dependent variable. Cox models were also used to assess the associations between FES scores, being afraid of falling, and admission to an aged care institution. We adjusted for several established predictors of falls (see Table 2, footnote) and of nursing home admission (see Table 3, footnote).

Linear regression models were used to assess associations between baseline FES scores and changes in ADL and SF-36 scores. In the simplest models, change in ADL or SF-36 score was the dependent variable and the baseline ADL or SF-36 score was a covariate. We also constructed multivariable models, adjusting for factors likely to be associated with declines in ADLs and health status (see Tables 4 and 5, footnotes). Separate models were run with FES as a continuous variable and as a three-level categorical variable.

We were concerned to try to assess the effects of being afraid of falling and fall-related self-efficacy independent of actual falls. We did this in two ways. First, we included falls in the year prior to baseline (as a six-level continuous variable from 0 to ≥5 falls) as a covariate in multivariable models. Second, we conducted subgroup analyses among nonfallers, that is, persons who reported no falls in the year prior to baseline and no falls during follow-up.

Statistical significance was set at $p < .05$. Analyses were conducted using SAS statistical software (version 6.12).

## Results

A total of 528 subjects answered the question "Are you afraid of falling?" but only 418 were able to complete the baseline FES. Subjects who did not complete the FES tended to have more ADL limitations than other subjects (87% had one or more ADL limitations compared with 69% of other subjects). FES nonresponders were more likely to die (23% died) during follow-up than responders (14% died), but FES responders (6%) and nonresponders (6%) were equally likely to be admitted to an aged care institution. Similar percentages of FES responders (29%) and nonresponders (32%) said they were afraid of falling.

The mean age of study subjects was 77 years, and 57% of subjects were female. Thirty-nine percent of subjects reported one or more falls in the year prior to recruitment, and 41% experienced falls during follow-up. Thirty percent of

Table 1. Associations Between Baseline Characteristics and Falls Efficacy Scale Scores and Being Afraid of Falling

| | Falls Efficacy Scale Scores | | | Afraid of Falling | |
|---|---|---|---|---|---|
| Characteristic | ≤75 | 76–99 | 100 | Yes | No |
| *n* | 88 | 190 | 140 | 158 | 370 |
| Age in years mean (*SD*) | 77.6 (7.6) | 77.0 (7.2) | 75.8 (7.2) | 76.9 (7.7) | 76.7 (7.1) |
| Female sex | 62 (70%) | 111 (58%) | 76 (54%)* | 101 (64%) | 201 (54%)* |
| Falls in past year | | | | | |
| 0 | 47 (53%) | 114 (60%) | 101 (72%) | 75 (47%) | 248 (67%) |
| 1 | 22 (25%) | 41 (22%) | 27 (19%) | 44 (28%) | 71 (19%) |
| 2 | 6 (7%) | 20 (10%) | 4 (3%) | 18 (11%) | 25 (7%) |
| ≥3 | 13 (15%) | 16 (8%) | 8 (6%)*** | 21 (13%) | 26 (7%)* |
| Afraid of falling | 44 (50%) | 53 (28%) | 25 (18%)*** | — | — |
| Falls Efficacy Scale mean (*SD*) | — | — | — | 78.0 (21.7) | 89.4 (14.3)*** |
| History of stroke | 16 (18%) | 27 (14%) | 18 (13%) | 22 (14%) | 62 (17%) |
| History of hip fracture | 7 (8%) | 6 (3%) | 8 (6%) | 13 (8%) | 22 (6%) |
| Poor vision (self-reported) | 42 (48%) | 68 (36%) | 32 (23%)*** | 65 (41%) | 124 (34%) |
| Psychotropic drugs | 42 (48%) | 57 (30%) | 32 (23%)*** | 65 (41%) | 124 (34%) |
| Uses a walking aid | 49 (57%) | 52 (27%) | 40 (29%)*** | 72 (46%) | 123 (33%)** |
| Katz ADL scale | | | | | |
| 0 | 66 (75%) | 177 (93%) | 130 (93%) | 126 (80%) | 329 (89%) |
| 1 | 16 (18%) | 7 (4%) | 8 (6%) | 18 (12%) | 30 (8%) |
| ≥2 | 6 (7%) | 5 (3%) | 2 (1%)*** | 13 (8%) | 10 (3%)*** |
| Situations in which help is needed | | | | | |
| Heavy home work | 70 (80%) | 105 (56%) | 76 (54%)*** | 108 (69%) | 229 (62%) |
| Walking half a mile | 59 (68%) | 82 (44%) | 50 (36%)*** | 90 (58%) | 179 (49%) |
| Walking up stairs | 51 (59%) | 63 (34%) | 42 (30%)*** | 76 (49%) | 143 (39%)* |
| Total ADL score mean (*SD*) | 2.5 (1.8)*** | 1.4 (1.3) | 1.3 (1.4) | 2.2 (1.8) | 1.7 (1.5)*** |
| Living situation | | | | | |
| Lives with spouse | 28 (32%) | 52 (27%) | 54 (39%) | 57 (36%) | 118 (32%) |
| Lives with others | 22 (25%) | 39 (21%) | 21 (15%) | 38 (24%) | 69 (19%) |
| Lives alone | 38 (43%) | 99 (52%) | 65 (46%) | 63 (40%) | 183 (49%) |
| Total number of community services | | | | | |
| 0 | 22 (25%) | 102 (54%) | 92 (66%) | 54 (35%) | 185 (51%) |
| 1 | 36 (41%) | 52 (28%) | 34 (24%) | 64 (41%) | 115 (31%) |
| ≥2 | 29 (34%) | 33 (18%) | 13 (10%)*** | 38 (24%) | 66 (18%)** |

*$p < .05$; **$p < .01$; ***$p < .001$.

the subjects said they were afraid of falling: 40% of those who had fallen in the past year and 23% of those who had not fallen. The mean FES score was statistically significantly lower for persons who said they were afraid of falling (78.0 vs 89.4, $p = .001$). Fifty percent of persons who scored 75 or less on the FES said they were afraid of falling, compared with 18% of those with an FES score of 100.

Table 1 shows relationships between fear of falling and sociodemographic and health-related characteristics. Those who said they were afraid of falling or who had low fall-related self-efficacy tended to have poorer health than other subjects. Age, history of stroke or hip fracture, and living situation were the only characteristics that were not statistically significantly associated with either FES scores or fear of falling. Among the 131 subjects who completed both an SF-36 and an FES at baseline, scores on seven out of eight SF-36 subscales were statistically significantly lower in those with FES scores ≤ 75 than in those with an FES score of 100 (data not shown).

Table 2 shows associations between fear of falling at baseline and risk of falling during follow-up. A low FES score (≤75) was associated with increased risk of falling (adjusted hazard ratio 2.09, 95% confidence interval [CI] 1.31–3.33). This association was also present among persons who had not fallen in the year prior to recruitment into the study (adjusted hazard ratio 2.37, 95% [CI] 1.25–4.51). Answering yes to the question "Are you afraid of falling?" was not associated with falls after adjustment for confounders.

This study found some evidence that fear of falling increased the risk of admission to an aged care institution, particularly among nonfallers (see Table 3). Among persons with no falls in the year prior to the study and no falls during follow-up, a positive response to the question "Are you afraid of falling?" was associated with a greatly increased risk of institutionalization (adjusted relative risk = 4.95, 95% CI = 1.14–21.58). Low FES scores were not statistically significantly associated with admission to an aged care institution.

Table 4 shows that poorer FES scores were associated with greater declines in ability to perform ADLs ( $p < .001$

Table 2. Fear of Falling at Baseline and Risk of Falling During 12 Months of Follow-up

| Fear of Falling Variables | Falls: Yes | Falls: No | Crude Hazard Ratio (95% CI) | Adjusted Hazard Ratio† (95% CI) |
|---|---|---|---|---|
| All study subjects | | | | |
| Falls Efficacy Scale ($n = 418$) | | | | |
| 100 | 39 | 101 | 1.00 | 1.00 |
| 76–99 | 79 | 111 | 1.70 (1.16–2.49) | 1.49 (1.01–2.20) |
| ≤75 | 51 | 37 | 2.90 (1.91–4.40) | 2.09 (1.31–3.33) |
| Afraid of falling ($n = 528$) | | | | |
| Yes | 76 | 82 | 1.48 (1.12–1.95) | 1.21 (0.90–1.62) |
| No | 138 | 232 | | |
| Subjects with no falls in past year | | | | |
| Falls Efficacy Scale ($n = 262$) | | | | |
| 100 | 25 | 76 | 1.00 | 1.00 |
| 76–99 | 38 | 76 | 1.49 (0.90–2.46) | 1.43 (0.86–2.39) |
| ≤75 | 24 | 23 | 2.79 (1.59–4.90) | 2.37 (1.25–4.51) |
| Afraid of falling ($n = 323$) | | | | |
| Yes | 25 | 50 | 1.05 (0.67–1.64) | 0.83 (0.51–1.32) |
| No | 80 | 168 | | |

†Adjusted for age, sex, falls in past year (0–5), activities of daily living score (0–10), use of walking aid, history of stroke, use of psychotropic medications, impaired vision, and randomization group.

Table 3. Fear of Falling at Baseline and Risk of Admission to an Aged Care Institution During 12 Months of Follow-up

| Fear of Falling Variables | Aged Care Institution: Yes | Aged Care Institution: No | Crude Hazard Ratio (95% CI) | Adjusted Hazard Ratio† (95% CI) |
|---|---|---|---|---|
| All study subjects | | | | |
| Falls Efficacy Scale ($n = 418$) | | | | |
| 100 | 6 | 134 | 1.00 | 1.00 |
| 76–99 | 8 | 182 | 1.02 (0.35–2.94) | 0.81 (0.27–2.39) |
| ≤75 | 10 | 78 | 2.72 (0.97–7.48) | 1.27 (0.42–3.83) |
| $p$ (trend) | | | $p = .07$ | $p = .86$ |
| Afraid of falling ($n = 528$) | | | | |
| Yes | 14 | 144 | 1.95 (0.96–3.96) | 1.61 (0.77–3.37) |
| No | 17 | 353 | | |
| Subjects with no falls in past year or during follow-up | | | | |
| Falls Efficacy Scale ($n = 175$) | | | | |
| 100 | 2 | 74 | 1.00 | 1.00 |
| 76–99 | 3 | 73 | 1.57 (0.26–9.40) | 2.01 (0.29–13.95) |
| ≤75 | 3 | 20 | 5.38 (0.90–32.21) | 5.27 (0.65–42.84) |
| $p$ (trend) | | | $p = .14$ | $p = .16$ |
| Afraid of falling ($n = 218$) | | | | |
| Yes | 5 | 45 | 2.93 (0.90–9.61) | 4.95 (1.14–21.58) |
| No | 6 | 162 | | |

†Adjusted for age, sex, falls in past year (0–5), activities of daily living score (0–10), use of walking aid, history of stroke, number of community services used (0–5), and randomization group.

Table 4. Falls Efficacy Scale Scores (FES) at Baseline and Changes in Activities of Daily Living (ADL) During 12 Months of Follow-up

| | Continuous Variable | Categorical Variable (FES): ≤75 | Categorical Variable (FES): 76–99 | Categorical Variable (FES): 100 |
|---|---|---|---|---|
| All study subjects ($n = 307$) | | | | |
| Adjusted for baseline ADLs | −0.021*** | −0.829*** | −0.135 | 0.009 |
| Adjusted for multiple variables† | −0.019*** | −0.692** | −0.121 | −0.041 |
| Subjects with no falls in past year or during follow-up ($n = 127$) | | | | |
| Adjusted for baseline ADLs | −0.019* | −0.764 | −0.212 | −0.036 |
| Adjusted for multiple variables† | −0.017* | −0.594 | −0.192 | −0.104 |

*Note*: $p$ values are for change in ADL score in subjects with FES score ≤ 75 compared with subjects with FES score = 100.

†Adjusted for age, sex, falls in past year (0–5), activities of daily living score (0–10), use of walking aid, history of stroke, number of community services used (0–5), randomization group, and baseline ADLs.

$^*p < .05$; $^{**}p < .01$; $^{***}p < .001$.

for FES as a continuous variable). During the year of follow-up, total ADL score adjusted for multiple variables decreased by 0.69 tasks among persons with low FES scores (≤75), but decreased by only 0.04 tasks among persons with high FES scores of 100. A decline in ADL score of similar magnitude was found among nonfallers with low FES scores ($p = .04$ for FES as a continuous variable).

SF-36 scores (particularly scores on the Physical Function and Bodily Pain subscales) tended to decline most among persons with the poorest baseline FES scores (see Table 5). There were insufficient data to examine associations between FES and SF-36 scores in the subgroup of nonfallers.

We conducted further analyses to help assess possible bias due to exclusion of subjects with incomplete baseline FES scores. Forty-five subjects were missing only 1 of the 10 baseline FES items. We scored these subjects on the 9 available items and converted this to an FES score out of 100. Including these subjects in analyses made little difference to study results. The adjusted hazard ratio for an FES score ≤ 75 and falling during follow-up was 1.79 (compared with 2.09 in subjects with complete FES data) and 2.07 in subjects with no falls in the past year (compared with 2.37 in subjects with complete FES data). The adjusted hazard ratio for an FES score ≤ 75 and admission to an aged care institution was 1.85 (compared with 1.27 in subjects with complete FES data) and 4.68 in subjects with no falls in the past year (compared with 5.27 in subjects with complete FES data). Adding subjects with only 9 baseline FES items had minimal influence on the size of regression coefficients for changes in ADL and SF-36 scores (data not shown). However, the larger sample size ($n = 109$) meant that changes on five of the eight SF-36 subscales were statistically significant, compared with three in the main analysis ($n = 90$).

Table 5. Falls Efficacy Scale Scores (FES) at Baseline and Changes in SF-36 Scores During 12 Months of Follow-up ($n = 90$)

| SF-36 Scale | Continuous Variable | Categorical Variable (FES)* ≤75 | 76–99 | 100 |
|---|---|---|---|---|
| Physical Component Scale (PCS) | | | | |
| Adjusted for baseline PCS | −0.160** | −4.440 | −0.574 | 0.657 |
| Adjusted for multiple variables† | −0.169** | −5.556* | −0.378 | 0.904 |
| Mental Component Scale (MCS) | | | | |
| Adjusted for baseline MCS | −0.046 | −3.016 | −0.377 | 1.410 |
| Adjusted for multiple variables† | −0.041 | −2.660 | −0.944 | 1.943 |
| Bodily pain (BP) | | | | |
| Adjusted for baseline BP | −0.325 | −17.744* | −4.620 | 2.745 |
| Adjusted for multiple variables† | −0.323 | −19.457* | −4.764 | 3.159 |
| General health perceptions (GH) | | | | |
| Adjusted for baseline GH | −0.262* | −9.239 | −1.259 | −2.319 |
| Adjusted for multiple variables† | −0.305** | −10.371 | −2.340 | −0.618 |
| Mental health (MH) | | | | |
| Adjusted for baseline MH | −0.221 | −8.678* | −0.703 | 5.298 |
| Adjusted for multiple variables† | −0.238 | −8.376* | −0.606 | 5.736 |
| Physical function (PF) | | | | |
| Adjusted for baseline PF | −0.359* | −9.480* | −3.275 | 4.843 |
| Adjusted for multiple variables† | −0.385** | −12.253* | −1.650 | 4.818 |
| Role physical (RP) | | | | |
| Adjusted for baseline RP | −0.462 | −6.628 | 5.597 | 4.641 |
| Adjusted for multiple variables† | −0.475 | −8.553 | 4.811 | 8.161 |
| Role emotional (RE) | | | | |
| Adjusted for baseline RE | −0.206 | −9.986 | 0.468 | 3.875 |
| Adjusted for multiple variables† | 0.171 | −7.590 | −1.394 | 6.595 |
| Social function (SF) | | | | |
| Adjusted for baseline SF | −0.204 | −9.463 | 3.086 | 1.925 |
| Adjusted for multiple variables† | −0.229 | −12.700 | 1.177 | 4.024 |
| Vitality (VT) | | | | |
| Adjusted for baseline VT | −0.256 | −7.351 | −6.613 | 0.882 |
| Adjusted for multiple variables† | −0.241 | −8.556 | −6.618 | 1.165 |

*Notes*: $p$ values are for change in SF-36 score in subjects with FES score ≤ 75 compared with subjects with FES score = 100.

†Adjusted for age, sex, falls in past year (0–5), activities of daily living score (0–10), use of walking aid, history of stroke, number of community services used (0–5), randomization group, and relevant baseline SF-36 score.

*$p < .05$; **$p < .01$.

## Discussion

We found that low fall-related self-efficacy was associated with decline in ability to perform ADLs without assistance and deterioration on several SF-36 subscales. Low fall related self-efficacy was also associated with an increased risk of future falls. There was also a suggestion that being afraid of falling was associated with increased risk of admission to an aged care institution. These findings support the idea that fear of falling is a health problem that deserves attention in its own right.

Fear of falling is a health problem among nonfallers as well as fallers. In fact, we found that being afraid of falling was predictive of admission to an aged care institution only among nonfallers. We also found that the relationship between fall-related self-efficacy and decline in ADL skills was just as strong in nonfallers as in fallers. Tinetti and coworkers reported a much stronger association between fall-related self-efficacy and physical and social function than between falls and function (8). Howland and coworkers found that fear of falling was a stronger predictor of nonparticipation in social activities than a history of falls (5). These data suggest that fear of falling may be just as serious a health problem as falls themselves. Some nonfallers (and their caregivers) may have an image of falls as catastrophic events involving fractures, hospitalization, and nursing home admission. In contrast, many persons who have fallen (and their caregivers) are aware that most falls are fairly benign and do not cause any physical injury.

In the only other prospective study of fall-related self-efficacy published to date, Mendes de Leon found that low FES scores were associated with decline in ADLs only among persons who also had declining physical performance on tests of gait, balance, and arm and leg movement (9). These investigators hypothesized that high self-efficacy was needed to maintain ADL skills in the face of declining physical function. Our study did not include tests of physical performance, so we could not investigate this hypothesis.

We found that persons with low FES scores (≤75) had more deterioration on all SF-36 subscales than persons with higher FES scores. However, differences in changes in SF-36 scores between those with high and low FES scores were statistically significant for only three out of eight SF-36 subscales (Bodily Pain, Mental Health, and Physical Function). A cross-sectional study previously found statistically significant associations between fear of falling and scores on all SF-36 subscales (6,14). Further evidence for an effect of fall-related self-efficacy on health-related quality of life comes from a recently completed randomized trial of an intervention to reduce fear of falling, which found improved FES scores and improvements in scores on the Sickness Impact Profile in the intervention group (15).

How does low fall-related self-efficacy affect physical and psychosocial health status? Bandura's theory of self-efficacy predicts that the ability to perform tasks depends on both physical ability and mental confidence, or self-efficacy (16). Thus, an association between low fall-related self-efficacy and deteriorations in performance of ADLs and on the Physical Function scale of the SF-36 are to be expected. Reduced physical activity by older people can lead to a vicious circle of declining physical and mental health that might eventually lead to admission to an aged care institution.

Our study has a number of limitations related to selection of subjects and loss to follow-up. The subjects in this study were primarily recruited for a randomized trial, so, as in many randomized trials, we recruited only a small fraction of all eligible subjects (17). Hence, it is unlikely that our subjects were representative of all older people admitted to the study hospitals during the study period. In addition, 21% of subjects were unable to complete all 10 questions of the FES at baseline. This was often because persons were unwilling to answer questions that referred to tasks they were unable to perform. Hence, subjects who did not complete the FES tended to have more ADL deficiencies than those who completed the FES. It is somewhat reassuring that the mean score on the FES of 86.1 in our study was similar to the mean score of 84.9 in Tinetti's study of 1,103 older people living in the community in New Haven, CT (8).

An unavoidable weakness of our study is that, mainly because of death or admission to a nursing home, many subjects did not complete the 1-year follow-up SF-36 and ADL assessments. It seems likely that subjects who were admitted to nursing homes or who died would have tended to have had greater declines in ADL and SF-36 scores than other subjects. Furthermore, our data show that baseline FES scores were lower in subjects lost to follow-up (83.2, compared with 86.9). Hence, loss to follow-up may have caused us to underestimate the magnitude of associations between low fall-related self-efficacy and deterioration in ADL and SF-36 scores.

Most subjects in our study were recruited in hospital while recovering from an acute illness. This limits the generalizability of our findings to older people living in the community. Sicker people tend to have a lower sense of fall-related self-efficacy (14). How an acute illness might influence future changes in ADL and SF-36 scores is unclear. There are two possibilities. First, if the illness is completely cured, then the most severely affected persons (who will tend to have the lowest FES scores) will show the greatest improvements in function and health. In this first scenario, a hospital-based study like ours would tend to underestimate associations between low fall-related self-efficacy and declines in ADL and SF-36 scores. Alternatively, persons with the most severe disease might be least likely to completely recover, so they would show the greatest deterioration in function and health. In this second scenario, a hospital-based study such as ours would tend to overestimate associations between low fall-related self-efficacy and declines in ADL and SF-36 scores. We believe the second scenario is more likely in studies of older people.

The prospective design of our study supports the conclusion that fear of falling leads to deteriorating health. In cross-sectional studies, it is impossible to determine whether poor health is a cause of fear of falling or fear of falling is a cause of poor health. Controlling for numerous baseline measures of health, we found that baseline fear of falling was associated with changes over the next 12 months in ADLs and SF-36 scores.

We found that low fall-related self-efficacy was strongly associated with future falls, even in persons who had not fallen recently. Several studies have found that falls lead to decline in physical and social function and nursing home admission (18–22). We restricted some analyses to nonfallers (no falls in the year before study or during the study) to guard against the possibility that fear of falling is simply a proxy measure of falls. In these nonfallers, fear of falling was associated with declines in ADLs and admission to an aged care institution.

Thirty percent of the subjects in our study reported that they were afraid of falling. The prevalence of being afraid of falling in other studies has ranged from 26% to 61% (2,3,5–8,23). Howland and coworkers found that more people were afraid of falling (26%) than were afraid of being robbed (17%) or of having financial problems (12%) (5). Fear of falling is clearly a common health problem among older people.

The combined evidence from our prospective study and that of Mendes de Leon and coworkers (9) suggests that poor fall-related self-efficacy leads to deteriorating quality of life, impaired function, and loss of independence. This means that interventions designed to reduce fear of falling and improve fall-related self-efficacy may have major health benefits for older people (15).

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