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Characteristics Associated with Fear of Falling and Activity Restriction in Community-Living Older Persons

Susan L. Murphy, ScD OTR/L[*], **Christianna S. Williams, MPH**[*], and **Thomas M. Gill, MD**[†]

[*] Department of Epidemiology and Public Health, Yale University School of Medicine, New Haven, Connecticut

[†] Dorothy Adler Geriatric Assessment Center, Yale University School of Medicine, New Haven, Connecticut

Abstract

OBJECTIVES—To identify the characteristics associated with restricting activity because of fear of falling (activity restriction) and to determine which characteristics distinguish older persons who restrict activity from those who have fear of falling but do not restrict their activities (fear of falling alone).

DESIGN—Population-based cross-sectional study.

SETTING—General community.

PARTICIPANTS—One thousand sixty-four community-living persons aged 72 and older.

MEASUREMENTS—Candidate predictors were identified from the following domains: demographic, health status, physical, psychosocial, and fall-related. The outcome measure was the report of no fear of falling, fear of falling alone, or activity restriction.

RESULTS—Fifty-seven percent of the cohort reported no fear of falling, 24% reported fear of falling alone, and 19% reported restricting activity. The proportion of participants with poor health status, slow timed physical performance, activities of daily living disability, and poor psychosocial function was highest in those with activity restriction, intermediate in those with fear of falling alone, and lowest in those with no fear of falling. Of participants with fear of falling, characteristics independently associated with activity restriction were history of an injurious fall, slow timed physical performance, two or more chronic conditions, and depressive symptoms.

CONCLUSION—Older persons who restrict activity are more physically frail and have a greater burden of chronic conditions and depressive symptoms than those who have fear of falling alone. These differences between persons with fear of falling may guide the refinement of clinical interventions and preventative programs.

Keywords

activity restriction; fear of falling; falling; older population

Fear of falling is considered a common and potentially serious problem in older persons. Approximately 25% to 55% of community-living older persons acknowledge being afraid of falling;[1–5] the prevalence is even higher among women and persons with a previous fall history.[3,6] Fear of falling is thought to contribute to a loss of independence through the

Address correspondence to Susan L. Murphy, ScD OTR/L, Post-Doctoral Fellow, Yale University School of Medicine, Department of Epidemiology and Public Health, 60 College Street, PO Box 208034, New Haven, CT 06520. susan.murphy@yale.edu.

restriction of activities,[7–9] but fear of falling may not invariably cause older persons to restrict their activities. In fact, fear of falling likely has a range of consequences, from increased caution during performance of daily activities, which may be protective against falls, to an excessive restriction of activities, which may be debilitating.[4,10] In this broadened view, fear of falling may not be damaging unless it interferes with activity performance.[10] Because it may reduce social interaction[2,4] and lead to inactivity and subsequent decline in physical capabilities,[4,11,12] activity restriction due to fear of falling (hereafter referred to simply as activity restriction) is a potential threat to the physical and mental well-being of older persons.

Relatively little is known about older persons who restrict activity because of fear of falling or how they differ from those with fear of falling alone or those with no fear of falling. Activity restriction has been examined in only a few previous studies that included nonrepresentative populations and relied exclusively on self-reported measures as candidate predictors.[4,13] In these studies, older persons who restricted their activities reported poorer physical functioning than those with no fear of falling[13] and had less social support than those with fear of falling alone.[4] The goals of the current population-based study, which included both self-report and performance-based measures, were to identify the characteristics associated with activity restriction in community-living older persons and to determine how older persons with activity restriction differ from those with fear of falling alone. We hypothesized that participants with activity restriction would have poorer health status and worse physical and psychosocial function than participants with fear of falling alone or those with no fear of falling.

METHODS

Sample

Study participants were members of the Project Safety cohort, a representative sample of noninstitutionalized persons aged 72 and older, living in New Haven, Connecticut, in 1989.[14,15] The sampling technique, described in detail elsewhere,[14,15] was similar to that used to establish the New Haven site of the Established Populations for Epidemiologic Studies of the Elderly.[16] One thousand four hundred thirty-six persons were originally contacted. Only 44 (3%) failed to meet the three eligibility criteria, which were the ability to speak English, Spanish, or Italian; to follow simple commands; and to walk across a room without the assistance of another person. Of those eligible, 1,103 (79%) agreed to participate and were enrolled in the cohort.[14] These cohort members did not differ significantly from persons who declined to participate in terms of age, sex, or proportion living in the community.[15] The 1,064 Project Safety members (96%) who had complete data on fear of falling and activity restriction at baseline were included in the current study.

Data Collection

During a comprehensive home-based assessment, trained research nurses asked participants whether they were afraid of falling (yes/no). Those who reported a fear of falling were asked whether the fear had caused them to cut down on their activities (yes/no). Based on these responses, participants were categorized into three distinct groups: no fear of falling, fear of falling alone, or activity restriction.

Candidate predictors were considered from several domains, including those that have been associated in previous studies with falling, fear of falling, or activity restriction. To facilitate clinical interpretation and permit calculation of relative risks, all variables were dichotomized using cutoff points that are generally accepted or that have been used in earlier analyses of this cohort.[14,17–19]

Demographic variables included age, gender, race, education, and living situation. Health status variables included chronic conditions, chronic dizziness, medication use, visual impairment, and cognitive status. The number of chronic conditions (myocardial infarction, stroke, cancer, diabetes mellitus, previous hip fracture, other fractures since age 50, Parkinson's disease, amputations, and arthritis) was ascertained through self-report. Chronic dizziness was defined as having dizzy episodes within the past 2 months lasting at least 1 month.[18] Medications were recorded directly from bottles and containers. Corrected near visual acuity was assessed with the Rosenbaum card and the percentage of visual impairment was calculated;[20] participants with a score of 50% or greater were considered to be visually impaired.[17] Cognition was assessed by the Mini-Mental State Examination;[21] participants with a score of less than 24 were considered to be cognitively impaired.

Information was available on observed and self-reported physical function. Observed physical performance was assessed by a composite of three timed tests: walking rapidly over a 20-foot course, turning in a circle, and rising from and sitting down in a chair three times.[19,22] To diminish the effect of outliers, a worst possible time of 60 seconds was established for the walking test and 30 seconds for the other two tests. Each test was rescaled (0 to 1) by dividing each participant's score into the worst possible score and subtracting from 1 to reflect better performance with a higher score.[19,22] Scores across the three tests were summed, and a score of less than 2.3 was established to compare participants in the worst quartile of performance versus the other three quartiles. Self-reported function in six basic activities of daily living (ADLs) was assessed by the modified Katz Index.[23] Disability was defined as the need for human assistance or the inability to complete the task; participants with a disability in one or more ADLs were determined to have a disability.[14] Self-reported function in instrumental activities of daily living (IADLs) was assessed by ascertaining the frequency of participation in light and heavy housework, light and heavy yard work, heavy home repair, and driving. Responses were dichotomized as participate versus do not participate; a cutoff point of participation in fewer than two IADLs was used in the analysis.

Psychosocial function included social support, anxiety, and depression. To assess social support, participants were asked whether anyone was available to help them with daily tasks (instrumental support) and whether anyone was available to provide emotional support. Responses were coded as not available versus available or not needed. Anxiety was assessed using the Spielberger State-Trait Anxiety Index;[24] participants with a score of 32 or greater were determined to have anxiety. Depression was assessed by the Center for Epidemiologic Study—Depression scale;[25] participants with a score of 16 or greater were determined to be depressed. Because 11% and 13% of data were missing for these latter two variables, respectively, we chose to create dummy variables rather than discard observations with missing data. This approach allowed us to make full use of the data and facilitated comparisons between participants with and without complete data.

Fall-related variables were ascertained by asking participants whether they had fallen in the past year, (if yes) the number of falls sustained, and whether they had sought medical attention for their injuries, hereafter referred to as an injurious fall.

Statistical Analysis

In the bivariate analysis, we first examined the association between the candidate predictors and a three-level outcome variable (no fear of falling, fear of falling alone, and activity restriction) in the entire cohort, using chi-square tests for linear trend. Next, in participants with fear of falling, we identified characteristics associated with activity restriction, using chi-square tests. In the multivariate analysis, we identified characteristics independently associated with activity restriction in participants with fear of falling using binomial regression analysis. Characteristics were eligible for inclusion in the multivariable model if

they were associated with activity restriction in the bivariate analysis at the level of $P < .05$. Housing type (age-restricted private, age-restricted public, or community) was included in the multivariable models to account for the original sampling strategy.[14] For the final models, adjusted relative risks were estimated from a generalized linear model by using a log link and a binomial error structure with a slight modification to ensure that the predicted probabilities remained in the range of 0 and 1.[26] All analyses were conducted using SAS, version 6.12 (SAS Institute, Inc., Cary, NC).

RESULTS

The mean age ± standard deviation of the 1,064 participants was 79.6 ± 5.3 (range 72–98); 73% were female, 84% were white, 23% were married, and 70% lived alone. The average education was 9.6 ± 3.6 years. Fifty-seven percent of the participants reported having no fear of falling (n = 608), 24% reported having fear of falling alone (n = 254), and 19% reported activity restriction (n = 202). Forty-four percent of participants with a fear of falling reported activity restriction.

Table 1 shows the results of the bivariate analysis. The proportion of participants who were aged 80 and older, who were female, who were white, and who had poor health status, denoted by the presence of two or more chronic conditions, chronic dizziness, five or more medications, or visual impairment, was highest in those with activity restriction, intermediate in those with fear of falling alone, and lowest in those with no fear of falling. This trend was also found for each measure of physical and psychosocial function and for a history of an injurious fall in the past year. No trend was found for history of noninjurious falls, educational level, living situation, or cognitive status. Among participants with fear of falling, those with activity restriction were significantly more likely than those with fear of falling alone to be 80 and older and female and to have two or more chronic conditions, slow timed physical performance, ADL disability, a history of an injurious fall, anxiety, and depressive symptoms.

Table 2 shows the results of the multivariate analysis. The characteristics independently associated with activity restriction were a history of an injurious fall, slow timed physical performance, two or more chronic conditions, and depressive symptoms. An alternative model that included only participants with complete data on all measures (n = 358) yielded similar results (i.e., none of the relative risks changed by more than 0.1).

DISCUSSION

We found that about one-quarter of community-living older persons reported fear of falling alone, which is similar to that found in a previous study.[4] However, our rate of activity restriction (19%) was lower than that reported in previous studies, which included selected samples of older persons who resided in senior housing[3–5] or had rheumatoid arthritis.[13] Because our results were obtained from a population-based sample, they may be more generalizable to community-living older persons.

Few previous studies have examined the characteristics associated with activity restriction,[4,13] and none have included both self-report and performance-based measures. In the current population-based study, we found that several indicators of poor health status and physical and psychosocial function were most common in those with activity restriction, least common in those with no fear of falling, and intermediate in those with fear of falling alone. A similar trend for fall-related efficacy and participation in social and physical activities was observed in a previous cross-sectional study.[1]

In older persons with fear of falling, we identified a group of characteristics that distinguished those with activity restriction from those with fear of falling alone. In contrast to a previous study, in which the predictors of activity restriction reflected a lack of social support,[4] we found that a history of an injurious fall within the past year, slow timed physical performance, two or more chronic conditions, and depressive symptoms were all independently associated with activity restriction.

Some older adults who restrict activity because of fear of falling may do so as the direct result of an injurious fall.[27] The duration of activity restriction after an injurious fall is not known. Although we found an association between activity restriction and injurious falls over a 1-year period, a previous study found no association between activity restriction and injurious falls over a 5-year period.[4] For some individuals, activity restriction from an injurious fall might dissipate over time, perhaps due to recovery from fall-related injuries.

The slow timed physical performance by participants with activity restriction is consistent with the theory that activity restriction is associated with decreased physical capabilities.[4,11,12] Because poor physical performance is perhaps the strongest predictor of functional decline and disability,[22,28] interventions to improve strength, balance, and mobility in this group of high-risk older persons may be especially warranted.

Depressive symptoms were also independently associated with activity restriction. Previous studies have found that fear of falling is independently associated with poor mental health,[10] and that older persons who report being very afraid of falling have the highest levels of depression.[2] Fear of falling has also been shown to be strongly associated with generalized fearfulness[29] and with different fears, such as being robbed on the street.[3] Our findings, coupled with those of previous studies, suggest that fear of falling may be part of a more generalized psychological disorder.

A limitation of this cross-sectional study is that we cannot determine whether participants with no fear of falling had previously restricted their activity because they had been afraid of falling. Because some older persons may effectively manage their fear after restricting activity,[4] future studies should examine whether all activity restriction is detrimental to health and function. We ran our final multivariable models twice, with and without missing observations, and obtained similar results, suggesting that our findings are not contingent on the specific analytic strategy used to account for missing data.

It has been suggested that fear of falling should be treated by improving physical skills and fall-related efficacy to counteract excessive fear and avoidance behaviors during activity performance.[1,30] Our results suggest that other factors, such as depressive symptoms and multiple chronic conditions, should also be addressed when treating older persons with activity restriction. Although we cannot infer cause and effect relationships from this cross-sectional study, our results should help guide future research. Additional studies are needed to evaluate the functional consequences of activity restriction and fear of falling alone. An improved understanding of the important differences among older persons with fear of falling should facilitate the development of targeted interventions based on the specific needs of these distinct subgroups.

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Table 1

Characteristics of Participants Who Reported No Fear of Falling, Fear of Falling Alone, or Activity Restriction

	Prevalence (%)				
		Fear of Falling			
Characteristic	**No Fear of Falling (n = 608)**	**Fear of Falling Alone (n = 254)**	**Activity Restriction (n = 202)**	**Trend *P*-value***	**Activity Restriction vs Fear Alone *P*-value†**
Demographics					
Age ≥80	38.9	47.6	56.9	.001	.049
Gender, female	66.6	78.0	86.1	.001	.025
White	82.1	85.0	89.1	.043	.202
Education, ≤8 years	45.6	48.4	43.6	.570	.301
Lives alone	68.4	67.7	75.3	.145	.078
Health status					
≥2 chronic conditions	33.9	42.4	56.9	.001	.002
Chronic dizziness	18.2	30.8	34.2	.001	.448
≥5 Medications	32.2	37.0	45.1	.004	.082
Vision ≥50% impaired	37.3	44.0	45.9	.05	.679
Mini-Mental State Examination score <24	32.0	32.0	32.3	.997	.945
Physical Function					
Worst quartile—physical performance‡	17.9	26.8	44.2	.001	.001
Disability in ≥1 ADLs	8.9	14.9	22.5	.001	.039
Participates in <2 IADLs	14.2	28.2	31.8	.001	.397
Psychosocial function					
Instrumental support not available	5.9	7.3	12.1	.02	.089
Emotional support not available	6.8	12.2	12.3	.01	.986
Anxiety ≥32 STAI	38.4	59.7	70.2	.001	.031
Depression ≥16 CES-D	17.0	24.8	39.6	.001	.002
Fall-related§					
≥1 noninjurious fall(s) in the past year	23.4	30.7	26.2	.08	.971
Injurious fall in the past year	11.5	11.8	24.3	.001	.001

* Chi-square test for linear trend using the three-level outcome of no fear of falling, fear of falling alone, and activity restriction.

[†] Separate analysis of participants with fear of falling, comparing the two-level outcome of those with and without activity restriction.

[‡] See Methods for definition.

[§] The fall-related variables were compared to a reference group of No Falls in the Past Year.

ADLs = activities of daily living; IADLs = instrumental activities of daily living; STAI = Spielberger State-Trait Anxiety Index; CES-D = Center for Epidemiologic Study—Depression Scale.

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Table 2

Characteristics Independently Associated with Activity Restriction in Participants with Fear of Falling (n = 433)

Characteristic	Adjusted Relative Risk† (95% CI)	*P*-value
Age ≥80	1.05 (0.86 – 1.29)	.610
Gender, female	1.21 (0.89 – 1.67)	.229
≥2 chronic conditions	1.34 (1.08 – 1.65)	.007
Worst quartile— physical performance†	1.44 (1.18 – 1.75)	.0004
Disability in ≥1 ADLs	0.86 (0.68 – 1.09)	.222
Anxiety ≥32 STAI	1.11 (0.84 – 1.47)	.447
Depression ≥16 CES-D	1.27 (1.00 – 1.60)	.048
Injurious fall in the past year	1.36 (1.11 – 1.66)	.003

Note: Relative risks were estimated from the generalized linear model described in the Methods section and were adjusted for other characteristics in the model and for housing type.

† See Methods for definition.

ADLs = activities of daily living; STAI = Spielberger State-Trait Anxiety Index; CES-D = Center for Epidemiologic Study—Depression Scale; CI = confidence interval.