

# Risk Factors Associated with the Fear of Falling in Community-Living Elderly People in Korea: Role of Psychological Factors

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Little is known about the risk factors for the fear of falling in elderly Korean individuals. Thus, the present study aimed to investigate the risk factors for fear of falling in a representative elderly population of over 10,000 individuals aged 65 years and older. A multivariate multinomial analysis revealed that the risk factors associated with a severe fear of falling were being female [odds ratio (OR)=4.396], older age (OR=5.550 for those aged  $\geq 85$  years), lower level of education (OR=0.719 for those with  $\geq 13$  years of schooling), chronic illness (OR=2.788 for those with more than three chronic illnesses), poor subjective health (OR=6.268), functional impairments (OR=2.340), a history of falling (OR=7.062), and depression (OR=1.774). The ORs for each of these risk factors were particularly high in participants with a severe fear of falling. Particularly, a history of falling and/or poor subjective health status had strong independent associations with the fear of falling. The present findings may help health care professionals identify individuals that would benefit from interventions aimed at reducing the fear of falling.

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**Key Words** Fear of falling, Risk factor, Depression, Subjective health status.

## INTRODUCTION

Falls are a major threat to the well-being of older adults. Every year, one out of three individuals older than 65 years experiences a fall,<sup>1,2</sup> which can result in a variety of physical injuries including hip fractures, head traumas, and even an increased risk of early death. Approximately 32% of falls in older individuals result in severe injuries, which interfere with mobility and independence, or even fall-related death.<sup>3</sup> The death rate associated with falls among the elderly has sharply increased over the past decade,<sup>4</sup> during which time more than 19,700 deaths have been caused by unintentional injuries related to a fall.<sup>5</sup>

Because falls and fall-related injuries are not uncommon,

many elderly individuals worry about falling in later-life. This is an appropriate concern for frail individuals as it may result in the adoption of self-protective measures but it may also result in adverse consequences, such as restricted social participation, functional decline, a decreased quality of life, and, paradoxically, an increased risk of falling.<sup>6</sup> The fear of falling is thought to be a significant health problem, equal to that of actual falls,<sup>7</sup> which could increase health care utilization and costs. Fortunately, falls and the fear of falling are public health problems that are largely preventable. Most previous studies that investigated the fear of falling focused on sociodemographic and/or health-related variables, with few reporting on the extensive range of other types of risk factors associated with the fear of falling, including psychological variables such as depression and subjective health status. Thus, not only is there a scarcity of information on various aspects of falls and the fear of falling in Korea, but many studies have also failed to report the type of data necessary to design effective prevention programs for the Korean population. To the best of our knowledge, the present study is the first to investigate the risk factors associated with the fear of falling using a representative sample of over 10,000 elderly subjects in Korea.

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## METHODS

The present study analyzed data from the 2011 Survey of Living Conditions and Welfare Needs of Korean Older Persons (Korea Institute for Health and Social Affairs),<sup>8</sup> which has been conducted every 3 years since 2008 using representative samples of non-institutionalized elderly people in Korea that were recruited based on a stratified, two-stage cluster sampling design. This survey collected information via face-to-face interviews and all participants provided written informed consent; 11,542 elderly individuals older than 60 years completed the survey (response rate=76.2%) but the present analysis was limited to participants older than 65 years of age and ultimately included 10,674 elderly participants. This study was approved by the Research Ethics Committee of Chonbuk National University Hospital.

Fear of falling was assessed by asking the question “Are you afraid of falling?”; the response options of “very much”, “somewhat”, and “not at all” were recoded as severe, mild, and no fear of falling, respectively. Participants provided sociodemographic information regarding their age, gender, living situation (alone or not), and educational and economic status, as well as information about health-related variables such as chronic illnesses, functional impairments, and history of falls. The number of chronic illnesses was assessed by the question “Do you currently have a chronic illness for more than 3 months, which was diagnosed by a physician?.” The chronic illnesses included hypertension, stroke, hyperlipidemia, and ischemic heart disease. Functional impairments were defined as requiring help with personal care on at least one item of the Korean Instrumental Activities of Daily Living (K-IADL) questionnaire.<sup>9</sup> History of falls was assessed by the question “Have you experienced any falls during last year?”; the participants responded either “yes” or “no.”

The psychological variables assessed in the present study included depression and subjective health status. Subjective health status was evaluated by the question “How would you rate your health in general?”; the choices for the subjective health status were classified as very good, good, fair, poor, and very poor. For analysis, subjective health status classified subsequently as “good,” “fair,” or “poor,” which good included very good and good, fair included fair, and poor included poor and very poor. Depression was assessed by the Korean version of the short Geriatric Depression Scale (SGDS).<sup>10,11</sup> This is a 15-item, self-administered questionnaire on which scores range from 0–15; a score of 8 or higher is considered to indicate depression.

### Statistical analyses

Univariate analyses (chi-squared tests) were performed to

identify associations between fear of falling and the sociodemographic, health-related, and psychological variables. Independent variables that had significant group differences in the univariate analyses were included in a multivariate multinomial logistic regression analysis, which was performed to calculate adjusted odds ratios (OR) for mild and severe fear of falling.

## RESULTS

The univariate analyses revealed the independent variables that were associated with both mild and severe fear of falling (Table 1). Participants with mild and severe fear of falling were more likely to be female, have an older age, live alone, be less educated, have a low economic status, have a chronic illness, have a poor subjective health status, be functionally impaired, have a history of falling, and/or have depression. Of the 10,674 elderly participants assessed in the present study, 21.2% had experienced a fall during the last 12 months, 32.4% had a severe fear of falling, and 43.3% had a mild fear of falling.

The patterns of associations among the fear of falling and its risk factors were similar between those with a mild versus severe fear of falling, but were more evident in participants with a severe fear of falling. The multivariate multinomial regression analysis revealed that a severe fear of falling was independently associated with female gender (OR=4.396), older age (OR=1.552, 2.023, 4.243, and 5.550 for participants aged 70–74, 75–79, 80–84, and ≥85 years, respectively), lower level of education (OR=0.804 and 0.719 for 7–12 and ≥13 years of schooling, respectively), higher number of chronic illnesses (OR=1.440, 2.396, and 2.788 for one, two, or more than three chronic illnesses, respectively), poor subjective health (OR=2.380 and 6.268 for fair and poor health, respectively), and having functional impairment (OR=2.340), a history of falling (OR=7.062), and depression (OR=1.774), even after controlling for all confounding variables (Table 2). When compared to the ORs for a mild fear of falling, the ORs for a severe fear of falling increased by more than twofold, from 2.316 to 6.268, for those with a poor subjective health status, and from 2.572 to 7.062 for those with a history of falls.

## DISCUSSION

The present study demonstrated that female gender, older age, less education, chronic illness, poor subjective health status, functional impairments, a history of falls, and depression were risk factors for both mild and severe fear of falling on a multivariate multinomial regression analysis. These associations were more evident in elderly participants with a severe fear of falling than in those with a mild fear of falling. Addition-

**Table 1.** Sociodemographic, health-related and psychological characteristics of subjects

	Fear of falling			p-value
	No	Mild	Severe	
Gender				0.000
Male	1,809 (70.7)	1,821 (39.9)	910 (26.7)	
Female	748 (29.3)	2,741 (60.1)	2,498 (73.3)	
Age				0.000
65–69 yrs	1,112 (43.5)	1,337 (29.3)	694 (20.4)	
70–74 yrs	796 (31.1)	1,468 (32.2)	962 (28.2)	
75–79 yrs	443 (17.3)	1,068 (23.4)	873 (25.6)	
80–84 yrs	148 (5.8)	451 (9.9)	561 (16.5)	
85+ yrs	58 (2.3)	237 (5.2)	318 (9.3)	
Living alone				0.000
No	2,297 (89.8)	3,644 (79.9)	2,500 (73.4)	
Yes	260 (10.2)	918 (20.1)	908 (26.6)	
Educational status				0.000
No education	409 (16.0)	1,473 (32.3)	1,441 (42.3)	
6 yrs or less	821 (32.1)	1,683 (36.9)	1,233 (36.2)	
7–12 yrs	986 (38.5)	1,138 (24.9)	611 (17.9)	
13 yrs or more	342 (13.4)	268 (5.9)	123 (3.6)	
Economic status				0.000
1st quintile	289 (11.3)	923 (20.2)	899 (26.4)	
2nd quintile	438 (17.1)	959 (21.0)	718 (21.1)	
3rd quintile	547 (21.4)	917 (20.1)	632 (18.5)	
4th quintile	579 (22.7)	917 (20.1)	616 (18.1)	
5th quintile	703 (27.5)	846 (18.5)	544 (16.0)	
Chronic illness				0.000
0	575 (22.5)	447 (9.8)	116 (3.4)	
1	753 (29.4)	860 (18.8)	408 (12.0)	
2	625 (24.4)	1,114 (24.4)	812 (23.8)	
More than 3	604 (23.6)	2,142 (46.9)	2,072 (60.8)	
Subjective health status				0.000
Good	1,573 (61.5)	1,541 (33.8)	481 (14.1)	
Fair	515 (20.1)	1,116 (24.5)	631 (18.5)	
Poor	470 (18.4)	1,902 (41.7)	2,297 (67.4)	
Functional impairment				0.000
No	2,467 (96.6)	4,113 (90.2)	2,591 (76.1)	
Yes	88 (3.4)	447 (9.8)	814 (23.9)	
History of fall				0.000
No	2,408 (94.2)	3,807 (83.5)	2,100 (61.6)	
Yes	149 (5.8)	755 (16.5)	1,308 (38.4)	
Depression				0.000
No	2,188 (85.7)	3,268 (71.7)	1,871 (54.9)	
Yes	365 (14.3)	1,289 (28.3)	1,534 (45.1)	

All values are unweighted N (%) to give descriptive statistics on the characteristics of the study sample rather than nationally generalizable estimates

**Table 2.** Multinomial logistic regression analysis of variables affecting fear of falling

	Mild			Severe		
	OR	95% CI	p-value	OR	95% CI	p-value
<b>Gender</b>						
Male	1.000	Reference		1.000	Reference	
Female	2.767	2.447–3.128	0.000	4.396	3.794–5.093	0.000
<b>Age</b>						
65–69 yrs	1.000	Reference		1.000	Reference	
70–74 yrs	1.350	1.186–1.538	0.000	1.552	1.321–1.823	0.000
75–79 yrs	1.588	1.363–1.849	0.000	2.023	1.687–2.425	0.000
80–84 yrs	2.101	1.683–2.623	0.000	4.243	3.319–5.425	0.000
85+ yrs	2.648	1.912–3.668	0.000	5.550	3.917–7.863	0.000
<b>Living alone</b>						
No	1.000	Reference		1.000	Reference	
Yes	1.051	0.872–1.266	0.603	1.177	0.957–1.448	0.122
<b>Educational status</b>						
No education	1.000	Reference		1.000	Reference	
6 yrs or less	0.968	0.829–1.129	0.675	1.043	0.879–1.239	0.628
7–12 yrs	0.822	0.696–0.971	0.021	0.804	0.662–0.976	0.025
13 yrs or more	0.673	0.538–0.843	0.001	0.719	0.538–0.961	0.026
<b>Economic status</b>						
1st quintile	1.000	Reference		1.000	Reference	
2nd quintile	0.991	0.812–1.209	0.926	1.011	0.808–1.264	0.925
3rd quintile	0.938	0.766–1.149	0.539	1.003	0.796–1.264	0.980
4th quintile	0.993	0.809–1.220	0.949	1.074	0.847–1.361	0.556
5th quintile	0.806	0.653–0.994	0.044	0.870	0.681–1.110	0.262
<b>Chronic illness</b>						
0	1.000	Reference		1.000	Reference	
1	1.110	0.936–1.315	0.230	1.440	1.104–1.878	0.000
2	1.428	1.201–1.697	0.000	2.396	1.849–3.103	0.000
More than 3	1.837	1.537–2.196	0.000	2.788	2.150–3.616	0.007
<b>Subjective health status</b>						
Good	1.000	Reference		1.000	Reference	
Fair	1.570	1.368–1.802	0.000	2.380	1.994–2.840	0.000
Poor	2.316	1.996–2.687	0.000	6.268	5.251–7.483	0.000
<b>Functional impairment</b>						
No	1.000	Reference		1.000	Reference	
Yes	1.358	1.053–1.750	0.018	2.340	1.809–3.027	0.000
<b>History of fall</b>						
No	1.000	Reference		1.000	Reference	
Yes	2.572	2.117–3.125	0.000	7.062	5.779–8.630	0.000
<b>Depression</b>						
No	1.000	Reference		1.000	Reference	
Yes	1.325	1.146–1.533	0.000	1.774	1.515–2.078	0.000

All logistic regressions are weighted to reflect sampling design

ally, the importance of these findings was underscored by the fact that psychological factors such as depression and subjective health status had significant associations with fear of falling.

Although it is well-known that elderly individuals have a greater fear of falling if they have a history of falls, a chronic illness, or functional impairments, the present study found that poor subjective health status had the second-highest OR after a history of falls. It is interesting that the elderly participants who had a severe fear of falling had an OR of 6.268 for poor subjective health status, compared to elderly participants with good subjective health, and that elderly participants with depression had a greater fear of falling than those without depression. The present results, showing independent associations between poor subjective health status, depression and a fear of falling, support the findings of previous studies.<sup>12,13</sup> When elderly individuals evaluate their health as poor, they often lose confidence and tend to become more housebound. Similarly, elderly individuals with depression avoid activities and social interactions and tend to have a more negative view of themselves, which would in turn negatively affect their subjective health status. The fear of falling negatively affects the lives of elderly individuals in various ways. For example, approximately 40% of elderly individuals avoid activities due to a fear of falling.<sup>6,14</sup> However, activity restriction in and of itself could be a risk factor for additional falls because it can lead to muscle weakness, poor balance, more frailty, and even social isolation.<sup>15</sup> Therefore, because psychological variables such as subjective health status and depression are important modifiable risk factors, these variables should be taken into consideration when aiming to prevent and reduce the fear of falling.

Of the sociodemographic variables assessed in the present study, older age and female gender were the only significant risk factors associated with the fear of falling that were also identified in previous studies.<sup>6,14</sup> The present study also demonstrated that high level of education level had a positive association with the fear of falling, whereas living alone and economic status were not significantly related to fear of falling. Living alone and economic status showed non-significant result in some previous studies.<sup>6,7</sup> Other than age and gender, many sociodemographic variables have yet to be comprehensively studied and require further investigation.

The present study had several limitations that should be noted. First, a cross-sectional design was used; thus, causal relationships cannot be inferred. Future longitudinal studies are necessary to better understand the risk factors associated with fear of falling. Second, information about the fear of falling and its risk factors was gathered from retrospective self-reports, which may have been influenced by recall bias. However, the study also had several strengths: it focused on

diverse risk factors of both mild and severe fear of falling, including psychological variables, and utilized a large sample representative of the elderly population in Korea.

In conclusion, the evidence for older age, female gender, poor subjective health status, functional impairments, a history of falls, and depression as risk factors for fear of falling appears strong, while living alone, educational status, and economic status should be interpreted cautiously. The present findings may offer health care providers valuable insights into the relationships between fear of falling and its major risk factors, including depression, subjective health status, age, and history of falls.

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