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Falls-Related Self-Efficacy Is Independently Associated With Balance and Mobility in Older Women With Low Bone Mass

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Background. It is currently unknown whether falling is independently associated with measures of balance and mobility in older adults after accounting for relevant physiological functions. This cross-sectional study assessed the independent association of falls-related self-efficacy to balance and mobility after accounting for age, current physical activity, and performances in relevant physiological domains in 98 older women, aged 75–86 years, with low bone mass.

Methods. Falls-related self-efficacy was assessed by the Activities-Specific Balance Confidence Scale (ABC Scale). Measures of balance and mobility included the 13-item Community Balance and Mobility Scale (CB & M Scale) and gait speed under two conditions: normal-paced and fast-paced. Physiological assessment included postural sway, foot reaction time, dominant quadriceps and dorsiflexor strength, proprioception, tactile sensitivity, edge contrast sensitivity, and visual acuity.

Results. Falls-related self-efficacy was independently associated with both balance and mobility after accounting for age, current physical activity level, and performances in relevant physiological domains. Based on the standardized β coefficients, the ABC Scale score was more associated with measures of balance and mobility than measures of physiological function.

Conclusion. These results highlight the independent association of falls-related self-efficacy with physical performance in older women with low bone mass. Thus, clinicians may need to consider falls-related self-efficacy when assessing and treating balance and mobility in this population, and falls-related self-efficacy may be useful as a screening tool to identify those persons with impaired balance and mobility.

FALLS in older adults occur, at least in part, due to physiological impairments, such as muscular weakness and slowed reaction time (1). Such physiological impairments are associated with aging (2–4) and result in impaired balance and mobility, both of which are independent risk factors for falls (5–7). Psychological factors, such as fear of falling, may also significantly contribute to these changes in balance (8) and mobility (9,10). For example, changes in gait associated with increased risk of falling in older adults (e.g., decreased stride length and prolonged double support) may in fact be stabilizing adaptations related to fear of falling (10).

Fear of falling is reported by 30% or more of older adults who have no history of falling; it is twice that in older adults who have fallen (7,11). Fear of falling may be measured as a dichotomous variable (yes or no) or quantified with measurement tools developed using the concept of self-efficacy, such as the Falls Efficacy Scale (FES) (12) and the Activities-Specific Balance Confidence (ABC) Scale (13).

There is a strong association between fear of falling and measures of balance and mobility. Fear of falling is associated with increased spontaneous sway and decreased one-leg stance time (8), reduced gait speed (9,14), and more cautious stair negotiation (15). To our knowledge, it remains unknown whether fear of falling is independently associated with balance and mobility in older adults after accounting for performances in relevant physiological domains such as lower extremity strength, sensation, and vision. Better understanding of the relationship between fear of falling and measures of balance and mobility could enhance future interventions that aim to maintain older adults' independent function. Furthermore, few studies have examined fear of falling in older people with low bone mass, who are especially prone to fall-related fractures. Thus, we examined the independent association of fear of falling, assessed by a falls-related self-efficacy questionnaire (13), after accounting for performances in relevant physiological domains with measures of balance and mobility in older women with low bone mass.

Methods

Participants

The sample for this cross-sectional analysis consisted of 98 women, aged 75–86 years, who participated in our randomized, controlled trial that examined the effects of three different types of group-based exercise programs on fall risk (16) and bone health (17). This cohort has been detailed elsewhere (16). Briefly, all participants had osteoporosis or osteopenia diagnosed by dual-energy x-ray densitometry (18).

For our randomized, controlled trial, we excluded those women who: were living in care facilities, were of non-Caucasian race, regularly exercised twice weekly or more, had a neurological condition that affected balance (i.e., stroke and/or Parkinson's disease), or had a Mini-Mental State Examination (19) score of ≤ 23. All the women who qualified for our prospective study were included in this cross-sectional study.

The study was approved by the relevant university and hospital ethics boards. All participants gave written informed consent prior to participating in the study.

Descriptive Variables

In all participants, age was measured in years, standing height in centimetres, and mass in kilograms. Cognitive state was assessed using the Mini-Mental State Examination (19). General health was assessed by a questionnaire (20) regarding current medication use, current supplement use, and medical conditions. All participants also underwent a physician review of medical history and clinical assessment.

Dependent Variables: Measures of Balance and Mobility

To minimize the possible confounding influence of assessment order on participants' responses to the ABC Scale and their performances of balance and mobility, the variables of interest were assessed in random order, so some participants completed the ABC Scale prior to measures of balance and mobility, and others completed the ABC Scale afterwards.

The Community Balance and Mobility Scale.—The Community Balance and Mobility Scale (CB & M Scale; 21) is a reliable performance-based balance and mobility measure of 13 items. Items include timed single-leg stance, tandem walking, and stair mobility. Each item is rated on a 6-point scale, with 5 denoting the most successful completion of the item (maximum of 85 points). For example, for the single-leg stance, a participant was given a "0" grade if she was unable to sustain unilateral stance independently, "1" if the stance was sustained for 2–4 seconds, "2" if the stance was sustained for 5–9 seconds, "3" if the stance was sustained for 10–19 seconds, "4" if the stance was sustained for $\geq$20 seconds, and "5" if the stance was sustained for 45 seconds. This novel scale was chosen for its suitability to assess high-level functioning individuals (22,23). One trained assessor conducted all the CB & M Scale assessments.

Gait speed.—Gait speed was assessed with participants walking without shoes and without the use of walking aids along an 8-meter path, first at a self-selected speed and then at a fast-paced but safe speed. The test–retest reliability of gait speed in our laboratory is 0.95 (intra-class correlation coefficient). Gait speed was calculated from the mean of three trials. The cumulative distance and time of consecutive strides (i.e., from foot contact with one leg to the next foot contact with the same leg) were recorded by infrared-emitting diodes (NDI, Waterloo, ON, Canada) attached to the foot during the middle section (i.e., approximately a 4-meter section, representative of constant gait speed) of the 8-meter walkway.

Independent Variables

Falls-related self-efficacy.—The 16-item ABC Scale (13) assessed falls-related self-efficacy, with each item rated from 0% (no confidence) to 100% (complete confidence). The maximum score is 1600, which is then divided by the 16 items to provide a score out of 100. This scale has a 2-week test–retest reliability of intra-class correlation coefficient = 0.92 and internal consistency Cronbach's alpha of 0.96 (13). The ABC Scale score is correlated with other measures of self-efficacy, distinguishes between individuals of low and high mobility, and corresponds with balance performance measures (9,24). Two trained interviewers assisted participants in completing this questionnaire.

Physiological assessment.—The following physiological functions were assessed using the Physiological Profile Assessment (PPA) (25) (Prince of Wales Medical Research Institute, Randwick, Sydney, NSW, Australia): postural sway, dominant foot reaction time, dominant quadriceps strength, dominant dorsiflexor strength, proprioception and tactile sensation of the lower extremity, edge contrast sensitivity, and visual acuity. The PPA has been described in detail elsewhere (25). Briefly, postural sway was assessed using a sway-meter that measured displacements of the body (total sway path in millimeters) at the level of the waist. Simple reaction time of the dominant foot was assessed using a light as the stimulus and a foot-press as the response, and was measured in milliseconds. Dominant quadriceps strength was assessed (with the participant in a seated position) using a simple strain gauge to the nearest 0.5 kilogram. Dominant dorsiflexor strength at the ankle was assessed and recorded using a similar method. A composite strength score was calculated by summing the two scores and was normalized for body size using the formula: sum of strength scores (N) / [weight (kg) $\times$ height (m) / 2]. Proprioception was assessed using a lower limb–matching task, with errors recorded in degrees. Tactile sensitivity was assessed with a Semmes-Weinstein aesthesiometer. Edge contrast sensitivity was assessed using the Melbourne Edge Test. Corrected acuity was determined binocularly using a chart with high-contrast visual acuity letters and low-contrast (10%) letters.

Current physical activity level.—Each participant's current level of physical activity was determined by the Physical Activities Scale for the Elderly (PASE) questionnaire (26,27). The PASE is a 12-item scale for those persons who are 65 years of age or older that measures the average number of hours per day spent participating in leisure, household, and occupational physical activities over the previous 7-day period. The PASE questionnaire is valid and

Table 1. Descriptive Statistics for Descriptors and Outcome Measures of Interest ($N = 98$)

Variable*	Mean (*SD*)	Range
Age, y	79.3 (2.7)	75–86
Height, cm	158.5 (7.0)	139.6–178.9
Weight, kg	62.5 (10.77)	36.6–96.2
Medications	3.3 (2.6)	0–17
MMSE score (max. 30 pts)	29 (2)	24–30
ABC Scale score (max. 100 pts)	77 (20)	5–100
CB & M Scale score (max. 85 pts)	42 (19)	0–81
Normal-paced gait speed, m/s	0.98 (0.22)	0.34–1.6
Fast-paced gait speed, m/s	1.38 (0.30)	0.51–2.24
PASE Scale score	85.8 (40.6)	17.9–224.1
Postural sway, mm†	222.0 (93.2)	67.0–513.5
Foot reaction time, ms†	374 (69)	262–618
Dominant quadriceps strength, kg†	17 (7)	4–36
Dominant dorsiflexor strength, kg†	5.6 (2.6)	0–13.2
Proprioception, degrees†	1.9 (1.5)	0–11.6
Tactile sensitivity, lg10mg pressure†	4.3 (0.5)	3.0–5.2
Edge contrast sensitivity, db†	18 (2)	12–24
Visual acuity, high contrast (MAR) †	1.8 (2.7)	0.8–27.0
Visual acuity, low contrast (MAR)†	3.1 (3.0)	0.7–30.0

Notes: *High postural sway values, high foot reaction time values, low quadriceps strength values, low dorsiflexor strength values, high proprioception values, high tactile sensitivity values, low edge contrast values, and high visual acuity values indicate impaired performances. Low PASE Scale scores indicate low current physical activity level. Low MMSE scores indicate impaired cognitive function. Low CB & M Scale scores and low gait speed values indicate impaired balance and mobility. Low ABC Scale scores indicate low self-efficacy.

†Age-normative values (75- to 84-year-old women): postural sway (mm) = 75–230; foot reaction time (ms) = 240–362; dominant quadriceps strength (kg) = 10–26; dominant dorsiflexor strength (kg) = 5–10; proprioception (degrees) = 0.4–3.2; tactile sensitivity (lg10 mg pressure) = 3.6–4.6; edge contrast sensitivity (db) = 18–23; visual acuity (high contrast) (MAR) = 1.0–2.2; visual acuity (low contrast) (MAR) = 1.5–4.4.

MMSE = Mini-Mental State Examination; pts = points; ABC = Activities-Specific Balance Confidence; CB & M = Community Balance and Mobility; PASE = Physical Activity Scale for the Elderly; lg10mg pressure = logarithms of milligram pressure; db = decibel units; MAR = minimum angle resolvable.

reliable for older adults (26,27). Its score is associated with physiologic and performance characteristics (27).

Data Analyses

Descriptive data (i.e., mean and standard deviation) are reported for variables of interest. Variables with right-skewed distributions (postural sway, dominant foot reaction time, and visual acuity) were transformed using natural logarithm.

The level of association between the dependent variables (i.e., CB & M Scale score and gait speeds) and the independent variables (i.e., physiological function, ABC Scale score, PASE Scale score) and age were determined using the Pearson product moment coefficient of correlation. Alpha was set at $p \leq .05$.

Three hierarchical linear regression models were constructed to determine the independent association of falls-related self-efficacy with: (i) CB & M Scale score, (ii) normal-paced gait speed in meters per second, and (iii) fast-paced gait speed in meters per second. For each of these analyses, age and current physical activity level were statistically controlled by forcing these two variables into the regression model first. Relevant physiological functions for each dependent variable were then entered into the regression model. These independent variables were determined from the results of the Pearson product moment coefficient of correlation analyses and based on biological relevance (i.e., postural sway, composite strength, and foot reaction time were entered into each model regardless of the results of the correlation analyses). The ABC Scale score was entered last into each model.

Results

Characteristics of the Participants

Table 1 reports descriptive statistics for relevant descriptor variables and the outcome measures of interest. Age-normative values are provided for each of the physiological functions assessed by the PPA. These age-normative values are from the Randwick Falls and Fractures Study (28). Based on the findings of the physician's clinical assessments, all participants had normal neurological and musculoskeletal function.

Correlation Coefficients

The correlation coefficients between variables of interest are reported in Table 2. Age, PASE Scale score, postural sway, composite strength score, low-contrast visual acuity, and ABC Scale score were significantly associated with the CB & M Scale score ($p \leq .02$). Age, postural sway, foot reaction time, and visual acuity (high- and low-contrast), and ABC Scale score were significantly associated with normal-paced gait speed ($p \leq .01$). Visual acuity (high- and

Table 2. Pearson Product Moment Coefficient Matrix Between CB & M Scale Score, Gait Speed, and Age, Current Physical Activity Level, and Physiological Functions

Variable	Age	PASE	Postural Sway	Reaction Time	Composite Strength	Proprioception	Tactile Sensitivity	Edge Contrast	Acuity, High Contrast	Acuity, Low Contrast
CB & M	−0.24*	0.37*	−0.40*	−0.16	0.35*	−0.16	0.11	0.15	−0.09	−0.12
N-P Gait	−0.26*	0.16	−0.26*	−0.22*	0.17	−0.04	0.12	0.15	−0.16	−0.21*
F-P Gait	−0.16	0.24*	−0.14	−0.16	0.18	0.03	0.07	0.14	−0.19	−0.23*

Notes: Measurements: Gait speed in meters per second, age in years, sway in millimetres, reaction time in milliseconds, composite strength in Newton/weight in kilograms × height in meters/2, proprioception in degrees, tactile sensitivity in logarithms of milligrams pressure, edge contrast sensitivity in decibel units, visual acuity in minimum angle resolvable.

*$p < .05$.

CB & M = Community Balance and Mobility; N-P = normal-paced; F-P = fast-paced; PASE = Physical Activity Scale for the Elderly.

Table 3. Hierarchical Linear Regression Model Summary for Community Balance and Mobility Scale

Independent Variable	R^2	R^2 Change	Unstandardized β (Standard Error)	Standardized β	*p* Value
	Community Balance and Mobility Scale				
Model 1	0.191	0.191			
Age			−1.65 (0.65)	−0.24	.01
PASE Scale score			0.17 (0.04)	0.37	<.001
Model 2	0.393	0.202			
Age			−0.40 (0.62)	−0.06	.52
PASE Scale score			0.13 (0.04)	0.27	<.01
Composite strength			3.35 (1.19)	0.24	<.01
Postural sway			−15.10 (3.94)	−0.33	<.001
Acuity, low contrast			−8.22 (3.46)	−0.20	.02
Foot reaction time			−9.60 (9.19)	−0.09	.30
Model 3	0.573	0.180			
Age			−0.32 (0.53)	−0.04	.55
PASE Scale score			0.10 (0.03)	0.21	<.01
Composite strength			1.88 (1.03)	0.13	.07
Postural sway			−10.71 (3.40)	−0.24	<.01
Acuity, low contrast			−7.38 (2.92)	−0.18	.01
Foot reaction time			3.64 (8.05)	0.03	.65
ABC Scale score			0.45 (0.07)	0.48	<.001

Note: PASE = Physical Activity Scale for the Elderly; ABC = Activities-Specific Balance Confidence.

Table 4. Hierarchical Linear Regression Model Summary for Normal-Paced Gait Speed (m/s)

Independent Variable	R^2	R^2 Change	Unstandardized β (Standard Error)	Standardized β	*p* Value
	Normal-Paced Gait Speed				
Model 1	0.090	0.090			
Age			−0.02 (0.01)	−0.25	.01
PASE Scale score			0.001 (0.001)	0.16	.11
Model 2	0.224	0.134			
Age			−0.01 (0.01)	−0.10	.31
PASE Scale score			0.00 (0.001)	0.09	.34
Composite strength			0.02 (0.01)	0.12	.21
Postural sway			−0.11 (0.05)	−0.21	.03
Foot reaction time			−0.18 (0.12)	−0.15	.13
Acuity, low contrast			−0.11 (0.04)	−0.25	.01
Model 3	0.343	0.119			
Age			−0.01 (0.01)	−0.09	.33
PASE Scale score			0.000 (0.000)	0.05	.58
Composite strength			−0.005 (0.02)	−0.03	.72
Postural sway			−0.07 (0.05)	−0.14	.15
Foot reaction time			−0.06 (0.11)	−0.05	.61
Acuity, low contrast			−0.10 (0.04)	−0.23	.01
ABC Scale score			0.004 (0.001)	0.39	<.001

Note: PASE = Physical Activity Scale for the Elderly; ABC = Activities-Specific Balance Confidence.

low-contrast) and ABC Scale score were significantly associated with fast-paced gait speed ($p \leq .01$).

Hierarchical Linear Regression Models

CB & M Scale.—All 98 participants completed this performance scale. Based on the standardized β coefficients, the ABC Scale score showed the strongest association with the CB & M Scale score (standardized β = 0.48). Also, it was independently associated with the CB & M Scale score in the final model ($p < .001$) along with postural sway, low-contrast visual acuity, and physical activity. Age and current physical activity (i.e., PASE Scale score) together accounted for 19.1% of the variance. Adding postural sway, foot reaction time, composite strength score, and low-contrast visual acuity significantly improved the model ($F_{Change\ 4,91} = 7.57$, $p < .001$). Adding the ABC Scale score to the model resulted in an R^2 change of 18.0%, and significantly improved the model ($F_{Change\ 1,90} = 37.84$, $p < .001$). The total variance accounted by the final model was 57.3% (Table 3).

Normal-paced and fast-paced gait speed.—Based on the standardized β coefficients, the ABC Scale score showed the strongest association with both normal- and fast-paced gait speed (standardized β = 0.39 for both conditions), and was significantly associated with both conditions of gait ($p < .001$) along with low-contrast visual acuity in the final models.

Age and current physical activity level accounted for 9.0% of the variance in normal-paced gait speed. Adding postural sway, foot reaction time, composite strength score, and low-contrast visual acuity significantly improved the model ($F_{Change\ 4,90} = 3.88$, $p = .01$). Adding the ABC Scale score to the normal-paced gait speed model resulted in an R^2 change of 11.9%, and significantly improved the model ($F_{Change\ 1,89} = 16.11$, $p < .001$). The total variance accounted by the final model for normal-paced gait speed was 34.3% (Table 4).

Age and current physical activity level accounted for 8.4% of the variance in fast-paced gait speed. Adding postural sway, foot reaction time, composite strength score, and low-contrast visual acuity significantly improved the model ($F_{Change\ 4,90} = 3.08$, $p = .02$). Adding the ABC Scale score to the fast-paced gait speed model resulted in an R^2 change of 11.9%, and significantly improved the model ($F_{Change\ 1,89} = 15.40$, $p < .001$). The total variance accounted by the final model for fast-paced gait speed was 31.3% (Table 5).

Discussion

This study showed that falls-related self-efficacy is independently associated with measures of balance and mobility in older women with low bone mass. To our knowledge, this is the first study that has examined the independent association of falls-related self-efficacy to balance and mobility after accounting for age, current physical activity level, and performances in relevant physiological domains in older women with low bone mass. Of particular importance, falls-related self-efficacy was more associated with each dependent variable of interest than were measures of physiological function.

The results of this study concur with Bandura's Social Cognitive Theory (29), which states that perceived capability is more predictive of activity in a particular domain than is actual physical ability. Our results extend those of previous studies (30–32) that highlight the importance of self-efficacy in healthy aging. For instance, a large population-based study has demonstrated that older men's instrumental efficacy beliefs at baseline were associated with change in verbal memory over a 2.5-year follow-up (30). Also, instrumental self-efficacy beliefs significantly impacted perceived functional disability, independent of actual physical abilities in older adults (31). Furthermore, higher baseline self-efficacy had a buffering effect on subsequent functional decline in both high-functioning older adults (32) and those with knee osteoarthritis (33).

In contrast to previous studies (34–37), we found that the composite strength score of the dominant lower extremity was not significantly associated with CB & M Scale score or gait speeds, after accounting for age and current physical activity level. Also, postural sway was not significantly associated with gait speeds, after accounting for age and current physical activity level. Of interest, the mean strength of the quadriceps and dorsiflexors and the mean postural sway performance observed in this study are comparable to age-matched normative values (38), yet gait speeds are well below those reported for healthy older adults in their 70s (34).

A reason for these observed associations may relate to the nature of the study cohort–older women with low bone mass. Because these women are at high risk of fall-related fracture secondary to their low bone mass, low falls-related self-efficacy may be particularly evident and exert a great cautionary influence on performance and behavior. The mean ABC Scale score for this cohort was 77, lower than that of healthy older adults (mean = 91) (24). Thus, the significant independent association between falls-related self-efficacy and balance and mobility observed in our sample of older women may not be as evident in age-matched counterparts without low bone mass.

Our cross-sectional study shows that low-contrast visual acuity and postural sway are each significantly associated with balance and mobility in older women with low bone mass, after accounting for age and current physical activity level. Vision is important in judging distances, maintaining postural stability (39), and detecting obstacles. Postural sway, as assessed in this study, has been associated with sit-to-stand performances (36), voluntary stepping speed (40), and walking speed (36).

Falls-related self-efficacy accounted for 18% of the explained variance in the 13-item CB & M Scale score (Table 3). This strong relationship was anticipated as the ABC Scale is congruent with the performance tasks included in the CB & M Scale. For example, the CB & M Scale assesses a person's actual ability to climb stairs, and the ABC Scale measures that person's confidence to climb stairs. Falls-related self-efficacy accounted for 12% of the explained variance in both normal- and fast-paced gait speeds (Tables 4 and 5). These results extend those of previous studies that demonstrated a significant association between measures of self-efficacy and gait performance in older adults in whom bone health status was not ascertained (9,12,41).

Table 5. Hierarchical Linear Regression Model Summary for Fast-Paced Gait Speed (m/s)

	Fast-Paced Gait Speed				
Independent Variable	R^2	R^2 Change	Unstandardized β (Standard Error)	Standardized β	p Value
Model 1	0.084	0.084			
Age			−0.02 (0.01)	−0.16	.11
PASE Scale score			0.002 (0.001)	0.24	.02
Model 2	0.194	0.110			
Age			−0.004 (0.01)	−0.04	.72
PASE Scale score			0.001 (0.001)	0.18	.06
Composite strength			0.03 (0.02)	0.13	.20
Postural sway			−0.08 (0.07)	−0.11	.28
Foot reaction time			−0.14 (0.17)	−0.08	.39
Acuity, low contrast			−0.18 (0.06)	−0.29	<.01
Model 3	0.313	0.119			
Age			−0.003 (0.01)	−0.02	.80
PASE Scale score			0.001 (0.001)	0.14	.13
Composite strength			0.01 (0.02)	0.04	.70
Postural sway			−0.02 (0.07)	−0.03	.74
Foot reaction time			0.03 (0.16)	0.02	.87
Acuity, low contrast			−0.17 (0.06)	−0.27	<.01
ABC Scale score			0.01 (0.001)	0.39	<.001

Note: PASE = Physical Activity Scale for the Elderly; ABC = Activities-Specific Balance Confidence.

A clinical implication of these results is that clinicians may need to consider falls-related self-efficacy when assessing and treating balance and mobility in older adults with low bone mass. Our data suggest that these individuals may exhibit impaired balance and mobility secondary to both impaired physiological functions and low falls-related self-efficacy. Thus, successful rehabilitation of impaired balance and mobility in this population of older adults may require strategies that target both physiological functions and self-efficacy. Another clinical implication is that falls-related self-efficacy may be useful as a simple screening tool to identify older women with low bone mass with impaired balance and mobility. Previous cross-sectional studies in older adults showed that the ABC Scale score was associated with self-perceived need for assistance with outdoor walking (13,24), and distinguished fallers from nonfallers (13).

This study generates numerous research questions as to the mechanisms that underpin the independent association between falls-related self-efficacy and measures of balance and mobility. An underlying mechanism may relate to the neuroendocrine response of those persons with low self-efficacy to challenge. Low self-efficacy is a form of chronic emotional stress. When faced with a challenging everyday cognitive-behavioral task, healthy older adults with low self-efficacy experience greater stress, as demonstrated by an exaggerated response of the hypothalamic–pituitary–adrenal axis and increased production of glucocorticoids (GCs), compared with those in persons without low self-efficacy (42). Brain regions participating in motor control (such as motor cortex, cerebellum, basal ganglia, and spinal cord) have high levels of GC receptors (43,44). Recent evidence from animal studies suggests that both acute and chronic stress modulate motor system function and that these effects are partially modulated by GCs (45,46). Specifically, stress reduced skill movement accuracy and increased performance speed.

The cross-sectional design of this study prevents our ascertaining the temporal relationship between measures of interest. We can only speculate whether experiences of postural instability (i.e., trips or falls) led to low falls-related self-efficacy, or whether low falls-related self-efficacy led to activity restriction, poorer physiological function, and thus, postural instability. However, a number of large population-based, prospective studies (31,32) support Bandura's tenet that self-efficacy is more predictive of activity than is actual physical ability. We note that our small study sample consisted exclusively of women, specifically older women with low bone mass. The relationship between efficacy and performance is different between men and women (31), and it may also differ between older women with low, and normal, bone mass. Thus, the results of this study may not generalize to older men, or to older women with normal bone mass. Furthermore, the independent association may be stronger in older adults with a history of falls, especially injurious falls. Thus, future population-based, prospective studies are needed to test whether our present findings also apply in larger, more heterogeneous populations. Also, more research is needed to ascertain whether there is a difference in the strength of association between self-efficacy beliefs and physical performance between sexes (30) and among subgroups of older adults (e.g., differing levels of balance and bone health, and older adults who are multiple fallers).

This cross-sectional analysis highlights that, in older women with low bone mass, falls-related self-efficacy is independently associated with balance and mobility after accounting for age, current physical activity level, and performances in relevant physiological domains. This finding generates numerous research questions as to the mechanisms that underpin this observation and has the clinical implications that clinicians may need to consider falls-related self-efficacy when assessing and treating balance and mobility in older adults with low bone mass.

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