



Featured Article

Falls efficacy scale – Formal caregivers: Adaptation and validation in Portuguese nursing homes

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ABSTRACT

The literature review shows that the fear of falling is present in older persons', but also in their careers and influences the performance of activities of daily living. The objective of this methodological study was to adapt and validate the Falls Efficacy Scale – Formal Caregivers. The development of the examined scale was based on the Falls Efficacy Scale – International, which was adapted for assessing the fear of falling in formal caregivers. The instrument was filled out by 319 formal caregivers of older people living in 11 Portuguese nursing homes for older people. Their average age was 46.8 ± 10.7 years, they had been working in this role for 13.4 ± 8.2 years, and 67.7 % of them attended vocational training in the workplace after being employed at the nursing home. Falls Efficacy Scale – Formal Caregivers, which contains 16 items, showed good internal consistency ($\alpha = 0.848$). These items were organized into 3 factors after exploratory and confirmatory factor analysis (lesser physical effort activities; intermediate physical effort activities, carried out in safe conditions; and intermediate physical effort activities, carried out in less safe conditions), with adequate convergent validity.

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Introduction

Falls are a complex geriatric syndrome, given their prevalence and projected growth in a population that shows longer life expectancy, greater dependence, several comorbidities, and polymedication. In addition to the biophysiological risk factors, older people are affected by other problems that increase the risk of falling and are also associated with the Fear of Falling (FoF), such as poor literacy, lack of knowledge about safe behaviors to prevent falls, financial difficulties in making environmental changes to the home to improve accessibility and mobility at home or even to buy footwear with the right characteristics for their foot and gait characteristics.¹⁻⁶

One study warned that, the FoF, affects between 3 % and 85 % of older people.² There are four decisive attributes of fear of falling: the apprehension caused by the unpredictable nature of falls, unease related to own vulnerability, high vigilance-related to the environment, and concern about potential harm after fall events.⁶

It can be present, not only in the population that has already fallen, but also in the group that has never fallen, since these individuals have the notion that this event can contribute to decreased physical activity, social activity⁶ and autonomy⁴ increased fall risk, and contribute to the loss of independence, activity avoidance, weakened muscle strength⁶ and loss of quality of life.⁴

Fear of falling, or ptophobia, can also occur in caregivers of older people in different settings of clinical practice. A study in Portugal that aimed to understand how fear of falling emerges and manifests in formal caregivers of institutionalized older people showed that

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this type of fear was present, that caregivers were aware that falls are a real danger, and the risk for falls are difficult to control.⁴

A study in Australia with caregivers of community-dwelling older people, reveals that concern about care recipients at risk of falling may be attributed to four themes 1) carers' perception of fall and fall risk, 2) older person behavior and attitude towards fall risk, 3) older person health and function, and 4) the living environment.¹

When the caregivers experienced previous situations of fall with serious lesions in their working hours, the psychological trauma, the guilt and the fear of consequences leads to overprotective behaviors, which can condition the autonomy and the independence of the older persons.⁴

A study with old adults hospitalized in the State of Wisconsin, in the United States of America, also indicated fear of falling in nursing group. The authors concluded that the intense messaging from the hospital administration department to reduce the number of falls to zero, had a negative effect, because it resulted in nurses developing a fear of falls, protecting self and unit, and restricting fall risk patients as a way to stop messages and meet the hospital goal.⁵

In nursing homes de FoF of the caregivers has a cognitive component, related to the perception of the fear of the older person himself, to beliefs associated to accidents, to previous experiences and to the notion of self-efficacy and control. It also has a behavioral component, which impels the formal caregivers to replace the older person in carrying out daily life activities.⁴

The findings of several studies have highlighted the need to improve caregivers' level of knowledge and strategies used to prevent falls and mitigate the FoF.^{1,4,6} The possible belief that falls are a natural consequence of aging can cause both older people and their caregivers to underestimate falls events and their consequences.⁴⁻⁷

A study that applied the Scale of Practices and Behaviors of Institutionalized Older Person to Prevent Falls, concluded that institutionalized older people don't talk to each other about risk factors for falls (1.29 ± 0.614), they hardly ever informed nurses (1.15 ± 0.522) and formal caregivers (1.24 ± 0.704) about the identified risk factors. It also shows that nurses (1.25 ± 0.733), physicians (1.26 ± 0.726), and other formal caregivers (1.33 ± 0.772) hardly ever warned older people about risk for falls.⁷

Fear of falling is present in older people and formal caregivers.^{1,4-7} Although it is not usual to talk about risk and FoF in nursing homes, they do influence the provision of care,⁴ specially to patients exposed to risk for falls⁴⁻⁵ by restricting patient movement (restraining patients or not allowing ambulation) and privacy.⁵

When falls with serious consequences occur, carers tend to implement restrictive measures both in the person who felt, but also on those who do not felt, as a consequence of the fear that an institutionalized older person will fall during their shift.⁴

Although it affects the whole team, it is not discussed, despite the knowledge that falls and fear of falling have serious consequences for older people's autonomy and independence.⁴

The Falls Efficacy Scale – International (FES-I), developed by Yardley et al., is a reliable and validated scale for measuring FoF in older people.⁸ The full version, with 16 items,⁹ and the short version, with 7 items¹⁰ were validated for application in Portugal.

Analysis of the publications on the topic also showed that there have been some attempts to develop a tool to evaluate fear of falls among caregivers of community-dwelling older people.¹¹⁻¹³ No studies were found addressing instruments to assess fear of falling among formal caregivers of institutionalized older people.

In view of the above, the objectives of the present study were adapting and validating the Falls Efficacy Scale – Formal Caregivers (FES#FC) to evaluate fear of falling experienced by formal caregivers of older people living in Portuguese nursing homes.

Material and methods

Study and scale adapting

This is a methodological study.¹⁴⁻¹⁵ The literature search did not identify instruments to assess, formal caregivers' fear that the older people who are receiving their care and live in nursing homes will fall. Since this variable is complex and difficult to observe, the authors opted to turn it into an observable and measurable variable.¹⁴

Given the consensus that FOF assessment should be carried out in a structured way by using FES-I,^{6,8-10} and the fact that the scale is centered on the confidence in carrying out activities the research team, after discussing this with experts and the author of the original scale, decided to adapt this instrument, to apply it, to formal caregivers.

The FES-I Portuguese version was adapted to create a new scale that will be apply to formal caregivers, the FES#FC.

The internal consistency of the FES-I Portuguese version was 0.962 and KMO was 0.95, with 65.2 % of the total variance was explained by two factors (Factor 1 (Concerns of the older person regarding less demanding activities, at a social and physical level) 34.4 % and by Factor 2 (Concerns of the older person regarding more demanding activities) 30.8 %). The observed correlation was 0.839, which reflects a high association between the two domains.⁹

The choice to adapt the FES-I to formal caregivers can be justified, not only by the satisfactory psychometric properties of the instrument reported in different cultural adaptation studies, but also by the need for similar instruments to measure this type of fear in institutionalized older people and caregivers. This can help elucidate how this feeling can affect decision-making by both populations regarding the most adequate care interventions, namely safety measures to be implemented during the execution of different activities of daily living.

The author of the FES-I gave his permission to use and adapted the scale. In addition, observations in different nursing homes, data collection in databases, and interviews with formal caregivers who worked in nursing homes were carried out to define the items that should make up the scale, which was subsequently submitted to pre-test, application, and validation steps.¹⁴⁻¹⁵

Given the specificity of the way nursing homes are organized, it was necessary to eliminate some items from the original scale and introduce new ones. The item "cleaning the house" was replaced by "tidying the bedroom" and the items "preparing simple meals", "visiting a friend or relative" and "attending a social event" were excluded, because they refer to activities only sporadically carried out.

The item "grabbing something above the level of the head or from the ground" was split into two, because during the spoken reflection between the nurses and researchers, it was considered that these activities involve different risks and characteristics from the biomechanical point of view.

The new items were "going out on the street with another older person", "going out on the street with a staff member" and "exercising". The initial scale had 22 items, which the formal caregivers were asked to fill out regarding their concern about the possibility of aged people falling during the execution of the activities mentioned in the instrument. Each item had 4 response options organized into a Likert scale (1 – not worried at all; 2 – a little worried; 3 – very worried; and 4 – extremely worried).

The data collection instrument had two parts: the first gathered sociodemographic data, and the second contained the scale itself. The sociodemographic information included in the instrument was gender, age, time working as a caregiver (in the current institution and in nursing homes in general), and frequency of professional training (before and after starting in the occupation).

Participants

The target population was formal caregivers of institutionalized older people who lived in nursing homes. The study occurred in 11 Portuguese nursing homes in the regions of Lisbon and the Tagus Valley. In order to guarantee some homogeneity in the characteristics of the institutions, the authors opted for nursing homes with capacity for at least 40 institutionalized older people, since the formal caregiver: older person ratio varies according to the number of residents. The selected institutions had to be close to other social, health, leisure, and cultural support facilities.

The inclusion criteria for formal caregivers working in nursing homes was: carrying out functions in the direct delivery of care to older people. The exclusion criteria were: professionals who held leadership positions, were on sick leave because of medical issues during the study period, or worked exclusively in home care or elderly day care centers.

The criterion for determining the sample size was the existence of at least 10 respondents per scale item,^{15–16} to allow the use of more robust tests. As the instrument had 22 items, a sample with a minimum number of 220 formal caregivers was necessary. Of 523 possible respondents, 319 filled out the instruments, which meant a reply rate of 60.9 %.

Data collection

The pretest occurred in February and March 2020 with 29 caregivers to verify whether the instrument was clear, and the participants could understand it, adequacy of the questions and Likert-like items, and average completion time. The pretest participants met the predefined inclusion criteria and worked in a nursing home with similar characteristics to those defined for this study. One of the researchers distributed the instruments and explained the purpose of the study, guaranteeing the anonymity of the answers. The pretest of the instruments was made, without the presence of the researcher, by the participants who agreed to take part in it. After collecting the instruments, an individual interview was scheduled between the respondent and the researcher, for spoken reflection to test the understanding of the tool by the target population.

Although the items were adapted from FES–I Portugal, formal caregivers tended to have a low level of education, and some did not even go through professional training for their position. Consequently, evaluating the instrument's intelligibility was necessary. The "spoken reflection", with 29 caregivers, allowed the researchers to improve the items and completion instructions. The participants were informed about the objective of the instrument and had written orientations in the first page about the instrument and the response options on the likert scale. No participants expressed any difficulty in completing the scale.

Permission to carry out the study was granted in 2019. However, in the 11 institutions where the participants worked, the COVID-19 pandemic changed the study schedule. Data collection had to be delayed because adapting to the pandemic became a priority. Observation of SARS-CoV-2 infection mitigation and control plans allowed the researchers to get back to the institutions only in May 2022. The instrument was applied between June and November 2022, as the authorizations were granted.

In order to guarantee the participants' anonymity, two boxes (boxes that couldn't be opened) were placed in the institutions and left there for 15 days (stored in an inaccessible place, but known to the team). The professionals could place their free and informed consent forms in one box, and their filled-out forms in the other. These boxes were later collected by a researcher.

Data analysis

Statistical tests were conducted using SPSS® software (Version 26 for Windows, IBM Corp., Chicago, IL, USA). Confirmatory factor

analysis was performed by using JASP software (version 0.13.1.0).¹⁷

Descriptive data analysis was performed by calculating frequencies, percentages, means, standard deviations (SD), medians, and ranges. Multivariate normality of the variables was assessed by applying skewness (coefficient of asymmetry) and kurtosis analyses.

Determination of the psychometric characteristics of the scale was based on reliability and validity tests. Analysis of the reliability of the scale considered the following premises: the Pearson correlation coefficient of each item considering the total scale without the item had to be greater than 0.20; and Cronbach's alpha of all the items of the instrument and of the scale as a whole, after exclusion of each item individually, had to be calculated.

Kaiser-Meyer-Olkin (KMO) test and Bartlett's index were used to test the sample adequacy and suitability of factor analysis and to assess the quality of the correlations between variables. Cattell's scree plot was used to check the number of factors to be retained. Varimax orthogonal rotation was used in exploratory factor analysis by extracting factors with eigenvalues greater than one.¹⁵

Construct validity was evaluated by using confirmatory factor analysis (CFA). Chi-square (χ^2) analysis is widely used to assess how well measurement models fit the data. However, because of the sensitivity of the χ^2 statistic to sample size, alternative goodness-of-fit measures were used: goodness-of-fit index (GFI); comparative fit index (CFI); standardized root mean squared residual (SRMR) index; parsimony-adjusted measures (PNFI); Holter index; expected cross-validation index (ECVI); and Akaike information criteria (AIC).

The heterotrait-monotrait (HTMT) ratio was used to examine discriminant validity.

Ethical considerations

The proposal was approved by the ethics committee of the Leiria Polytechnic Institute per protocol no CE/IPLEIRIA/46/2020. The study was authorized by the directors of the eleven nursing homes, and the participants were asked to sign the informed consent form. Questionnaires were completed anonymously. Participants entered the study of their own free will and could stop filling in the scale whenever they wanted, without penalty.

Results

The respondents were 319 formal caregivers at 11 Portuguese nursing homes. Their average age was 46.8 ± 10.7 years and they had been working in this role for 13.4 ± 8.2 years on average, of which 11.15 ± 7.4 years were in the institution where they developed their activities during the study period.

Regarding level of education, 6 % completed primary education, 28.5 % completed the lower secondary education, 40.1 % upper secondary education, 23.2 % completed post-secondary non-tertiary education, and 2.2 % attended an undergraduate course and dropped it before getting a degree. Regarding frequency of professional training that qualified them for their occupation, 35.7 % received it before beginning their professional activity and 67.7 % attended refresher courses after being employed in the nursing homes.

Construct reliability

Statistical analysis (construct reliability and validity) led to exclusion of six items, because they were not statistically significant. The excluded items were: Putting on or taking off clothes; Preparing simple meals; Walk; Go to the coffee/restaurant; Visiting a friend or relative; and Walking in crowded places.

Consequently, the modified scale had 16 items and an internal consistency expressed as a Cronbach's alpha (α) of 0.850, with this

Table 1
Pearson correlation coefficients of the items that make up the scale and Cronbach's alphas of the items for both the full scale and the scale without the item. Lisbon, 2023.

	Corrected full scale correlation coefficient	Cronbach's alpha after item exclusion
Tidying the bedroom	0.468	0.841
Putting on or taking off clothing	0.493	0.840
Showering	0.520	0.840
Going shopping	0.438	0.843
Sitting or getting up from a chair	0.516	0.839
Going up or down stairs	0.511	0.839
Walking around the neighborhood	0.404	0.844
Going out on the street with another older person	0.319	0.848
Going out on the street with a staff member	0.348	0.848
Grabbing something above the level of the head	0.636	0.831
Grabbing something from the ground	0.623	0.832
Picking up the phone	0.408	0.844
Walking on a slippery surface	0.385	0.845
Walking on an irregular surface	0.506	0.841
Going up or down a ramp	0.528	0.838
Exercising	0.460	0.842

index ranging from $\alpha=0.831$ to $\alpha=0.848$ after exclusion of the six itens (Table 1). Corrected Pearson correlation coefficients ranged between 0.319 and 0.636, which indicated homogeneity in the set of items.

Construct validity

The scale validity was assessed by applying exploratory factor analysis with extraction of factors by means of the principal component technique (Kaiser method), with varimax rotation. The 16 items organized themselves into three factors (Fig. 1). This factor analysis provided a KMO value of 0.854, which indicated good data adequacy. The Bartlett's test result was 1198.091, for $p < 0.001$ (Table 2). Table 2 shows that the three factors accounted for 49.593 % of the variance. It is noteworthy that the commonality values ranged from

0.292 to 0.684. The factor loading coefficient cut off was 0.40 (i.e. items with a factor loading of 0.40 or greater were retained). Table 3 shows the Pearson correlations between the three factors of the scale (total and between one another). The values ranged from 0.445 (moderate correlation) to 0.879 (strong correlation). Since the contents of each factor were known, they were designated as follows: lesser physical effort activities (F1); intermediate physical effort activities, carried out in safe conditions (F2); and intermediate physical effort activities, carried out in less safe conditions (F3). Before proceeding with CFA, it was necessary to observe whether the items of the scale respected the assumption of multivariate normal distribution. The distribution of each item showed mixed (positive and negative) skewness (from -1.53 to 0.37) and mixed (positive and negative) kurtosis (from -1.13 to 0.73). Based on Bryne¹⁸ and Hair et al.,¹⁹ it was assumed that skewness between -2 and $+2$ and kurtosis between -7 and $+7$ indicated normal distribution of the variables (Table 4). The model structure was made up of three latent variables (Fig. 2), 16 observed variables, and 16 error terms. The goodness-of-fit values were reasonable (CFI = 0.837, PNFI = 0.649, RMSEA = 0.083). The fitness indices are summarized in Table 5.

Convergent/discriminant validity

The values of average variance extracted allow assessment of convergent validity. They were 0.301 (F3), 0.350 (F1), and 0.367 (F2). Discriminant validity was found between factors. A heterotrait-monotrait (HTMT) ratio of correlation close to 1 indicates a lack of discriminant validity (Table 6). Pearson's r lower than 0.85 between variables verified the discriminant validity of the variables.²⁰⁻²¹ Table 7 presents the correlations between the 16 itens of the FES#FC.

Discussion

The aim of this study was to adapt and validate the FES-I for the formal caregivers of institutionalized older persons in Portugal. The

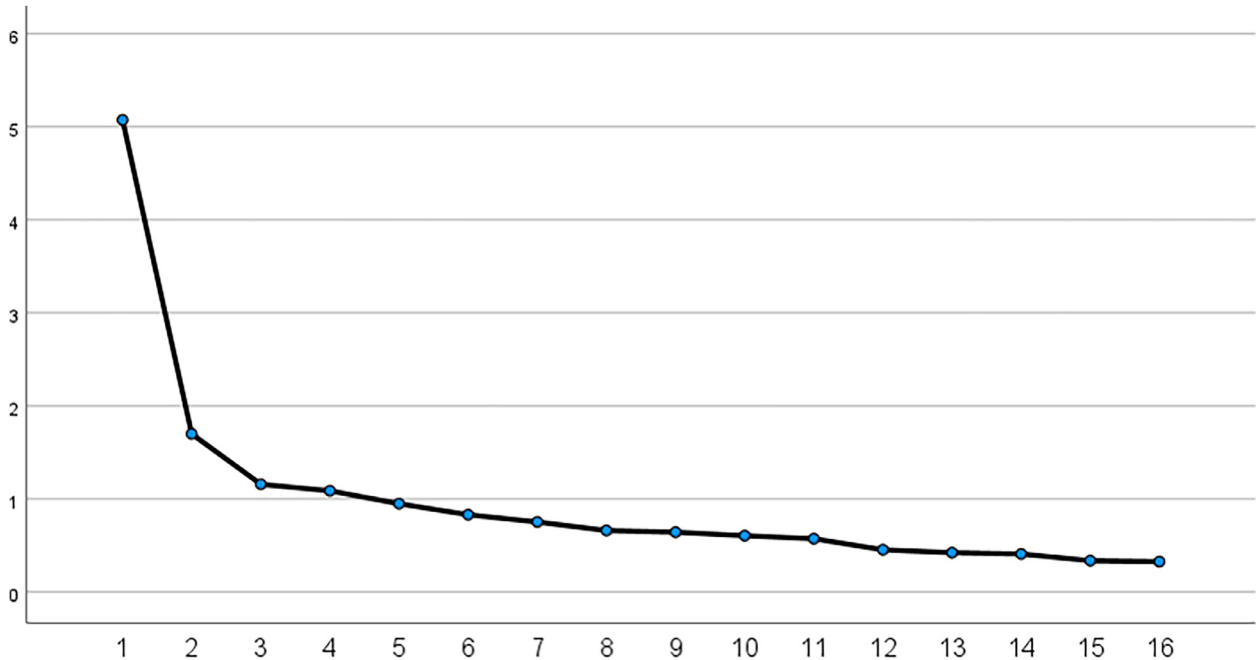


Fig. 1. Scree plot. Lisbon, 2023.

Table 2

Principal component matrix for the scale items after varimax rotation. Lisbon, 2023.

Item	H2	F1	F2	F3	Cronbach's alpha
Tidying the bedroom	0.377	0.506			0.782
Putting on or taking off clothing	0.379	0.499			
Going out on the street with a staff member	0.459	0.675			
Grabbing something above the level of the head	0.589	0.498			
Grabbing something from the ground	0.559	0.622			
Picking up the phone	0.551	0.740			
Exercising	0.476	0.606			
Going shopping	0.292		0.419		0.684
Sitting or getting up from a chair	0.684		0.743		
Going up or down stairs	0.643		0.697		
Going up or down a ramp	0.533		0.666		
Showering	0.530			0.652	.690
Walking around the neighborhood	0.278			0.435	
Going out on the street with another older person	0.602			0.762	
Walking on a slippery surface	0.472			0.590	
Walking on an irregular surface	0.512			0.538	
Total of explained variance	49.593				
% of variance explained by each factor		31.722	10.626	7.245	
Kaiser-Meyer-Olkin measure		0.854			
Bartlett's test of sphericity					
1198.091; $p < 0.001$					

Table 3

Pearson correlation coefficients (total and between factors). Lisbon, 2023.

	Total	Factor 1	Factor 2	Factor 3
Total	1	0.879**	0.743**	0.811**
Factor 1	0.879**	1	0.445**	0.535**
Factor 2	0.743**	0.445**	1	.0536**
Factor 3	0.811**	0.535**	0.536**	1

Table 4Mean scores and distribution parameters ($n = 319$). Lisbon, 2023.

Items	Min	Max	M	SD	Mdn	Sk	Ku
Tidying the bedroom	1.00	4.00	2.53	0.93	2.00	0.07	−0.86
Putting on or taking off clothing	1.00	4.00	2.60	0.83	3.00	0.11	−0.65
Showering	1.00	4.00	3.49	0.66	4.00	−1.10	0.73
Going shopping	1.00	4.00	2.91	1.03	3.00	−0.49	−0.97
Sitting or getting up from a chair	1.00	4.00	2.56	0.96	3.00	−0.12	−0.92
Going up or down stairs	1.00	4.00	3.08	0.94	3.00	−0.78	−0.33
Walking around the neighborhood	1.00	4.00	3.20	0.81	3.00	−0.62	−0.61
Going out on the street with another older person	1.00	4.00	3.27	0.83	3.00	−0.91	0.06
Going out on the street with a staff member	1.00	4.00	2.35	0.96	2.00	0.08	−0.98
Grabbing something above the level of the head	1.00	4.00	2.63	1.03	3.00	−0.19	−1.11
Grabbing something from the ground	1.00	4.00	2.76	0.95	3.00	−0.37	−0.75
Picking up the phone	1.00	4.00	2.09	0.922	2.00	0.37	−0.80
Walking on a slippery surface	1.00	4.00	3.55	0.69	4.00	−1.53	2.25
Walking on an irregular surface	1.00	4.00	3.58	0.66	4.00	−1.41	1.02
Going up or down a ramp	1.00	4.00	3.27	0.87	4.00	−0.99	0.092
Exercising	1.00	4.00	2.70	1.03	3.00	−0.21	−1.13

Caption: Min, minimum; Max, maximum; M, mean; SD, standard deviation; Mdn, median; sk, skewness; ku, kurtosis.

new scale present good psychometric proprieties'. Reliability analysis showed that the scale has good internal consistency, with $\alpha = 0.850$, indicating its ability to measure the fear experienced by caregivers that the institutionalized older people they care for in the nursing homes will fall.

This assessment is important to evaluate formal caregivers' fear of falling and the activities that originate greater concern regarding risk of falls and can allow studies that associate this fear with fall prevalence, practices to reduce risk of falls, and the evolution of older people's functioning according to this fear, since some studies have pointed out that ptophobia leads to measures that restrain independence and autonomy in institutionalized older people.^{1,4-5}

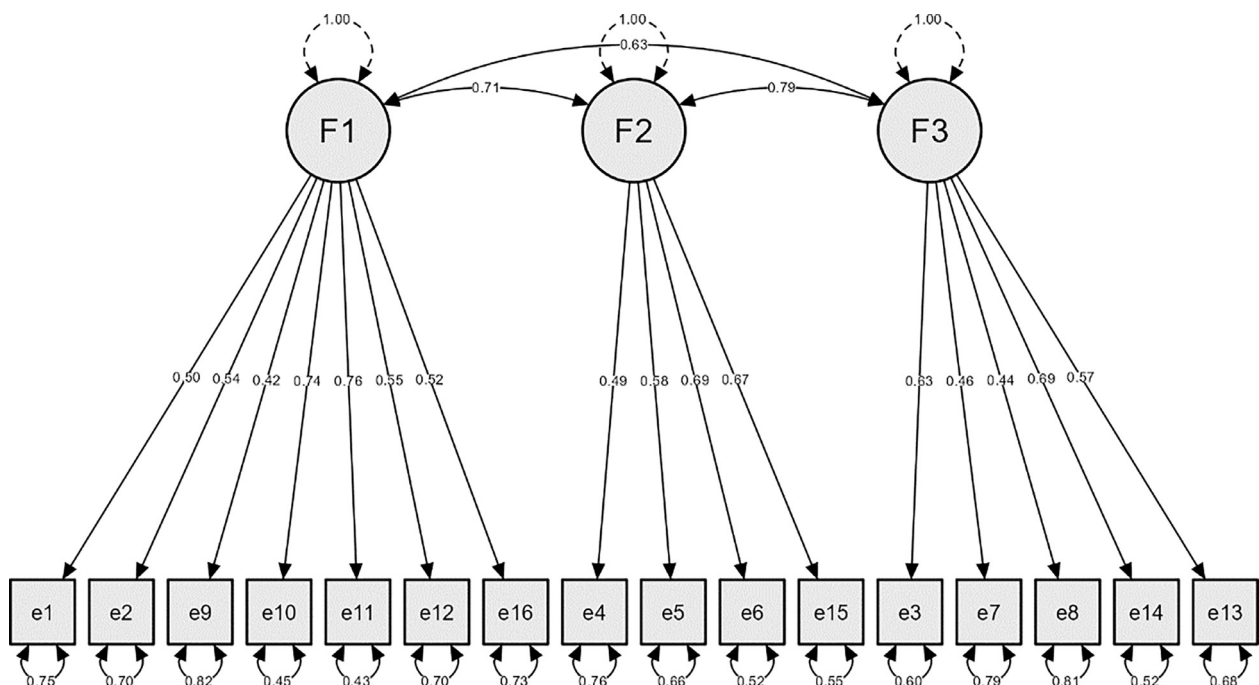
**Fig. 2.** The three-factor model (F1; F2; and F3) of the portuguese version of the Falls Efficacy Scale adapted for caregivers. Lisbon, 2023.

Table 5

Summary of the adjustment indices of the scale. Lisbon, 2023.

Measure	Recommended cutoffs*	Values
CFI – Comparative fit index	> 0.8	0.837
GFI – Goodness-of-fit index	> 0.8	0.983
PNFI – Parsimony normed fit index	> 0.5	0.649
HOELTER (0.1)	> 200	126.259
AIC – Akaike information criterion	–	9764.019
SRMR – Standardized root mean square residual	–	0.066
Expected cross-validation index – ECVI	–	1489
RMSEA – Root mean square error of approximation	–	0.083

*According to Biza-Khupe [20]; Byrne [18]; Hair et al. [19].

Table 6

Discriminant validity (heterotrait-monotrait ratio). Lisbon, 2023.

	F1	F2	F3
F1	1.000		
F2	0.650	1.000	
F3	0.540	0.724	1.000

It is known that the preoccupation of caregivers with keeping the older person safe leads them to choose safety measures influenced by the hidden fear of falling.⁴ A study that applied the Scale of Practices and Behaviors of Institutionalized Older Person to Prevent Falls in Institutionalized Older Person concluded that the practices of formal caregivers in managing the risk of falls of institutionalized elders, in the domains of the application of safety measures/guidance, in the prevention of falls during the provision of care, of practices related to the physical environment and of the practice of information and formation of the elder which were adopted were found to be positive and continuous in most cases.²²

The use of measures involving physical restriction of mobility were considered preventive measures by the sample, but had negative impacts on the institutionalized older people's, resulting in functionally decline.²² These results have indicated that fear, which is both a cause and a consequence of fall episodes,^{22–25} is also a crucial factor in team decision-making about preventive measures to be implemented.^{22–23}

The FoF, in nursing home professionals, is “fed” by the perception that the risk of falling is real, by the notion of the consequences for the life of older people, and the fear of the legal consequences.²² These aspects influence the self-efficacy perceived in the prevention

of falls.^{4,22} Teamwork quality, in turn, is affected by previous negative experiences and the support of the teams.⁴

Exploratory and confirmatory factor analysis showed the existence of three factors: lesser physical effort activities (F1); intermediate physical effort activities, carried out in safe conditions (F2); and intermediate physical effort activities, carried out in less safe conditions (F3). The study that explored the construct validity of FES-I, which had 16 items in its version for application to Portugal, identified two factors that the authors adapting “concerns of the older person regarding less demanding activities, at a social and physical level” (Factor 1) and “concerns of the older person regarding more demanding activities” (Factor 2).⁹ It must be emphasized that the validation of FES-I for application to Portugal was carried out with a community-dwelling group of older people rather than in residential structures for the older population.

The existence of a third factor that brings together the activities that show the highest fall risk are associated with environmental and behavioral risk factors that can increase fall prevalence in nursing homes^{26–29} makes sense and is related to risk of falls and mechanisms in these institutions. Environmental hazards in nursing homes cause 16 % to 27 % of falls among residents, many of whom fall in the bathroom during hygiene procedures²³ or as a consequence of wet floors.³⁰

The presence of major risk of falls, such as fall history, impaired performance in activities of daily living, insomnia, depression, vertigo, use of walking aids, poor balance, use of antidepressants, use of benzodiazepines, use of antipsychotics, use of anxiolytics, polypharmacy, dementia, unsteady gait, hearing problems, and gender (being male)^{26,31} exponentially increases risk of falls when the person is on wet and slippery surfaces (in the shower) or irregular surfaces. This increased risk has been associated with the type and severity of the resulting injuries.^{28–29}

It is recommended that future studies explore the association between caregivers' fear of falling and the specific characteristics of falls in older people who live in nursing homes.

Further studies should associate the fear of falling experienced by formal caregivers of older people with the 3 factors of the FES# FC to determine which activities generate the greatest apprehension/fear in caregivers and what strategies are adopted to minimize fear and reduce the risk of falls in the residents of nursing homes. Other studies have observed that the fear of falling on the part of FC can lead to practices restricting mobility and physical activity in the older person, with harmful consequences for their functionality, generating a vicious cycle of dependency and contributing to an increase in the risk, prevalence and injuries associated with falling.^{4,11,22,31–32}

Table 7

Pearson correlation coefficients between the scale items. Lisbon, 2023.

	e1	e2	e3	e4	e5	e6	e7	e8	e9	e10	e11	e12	e13	e14	e15	e16
e1																
e2	.403**															
e3	.307**	.322**														
e4	.332**	.265**	.364**													
e5	.332**	.388**	.184**	.277**												
e6	.200**	.249**	.355**	.297**	.400**											
e7	.143*	.189**	.306**	.192**	.236**	.360**										
e8	.107	.143*	.330**	.137*	.031	.302**	.301**									
e9	.261**	.212**	.108	.117	.288**	.047	.250**	.068								
e10	.342**	.343**	.308**	.270**	.505**	.437**	.215**	.165**	.304**							
e11	.309**	.414**	.380**	.329**	.353**	.325**	.155*	.235**	.266**	.581**						
e12	.290**	.284**	.154*	.146*	.212**	.062	.150*	.099	.375**	.389**	.458**					
e13	.161**	.226**	.350**	.218**	.151*	.346**	0.117	.303**	–0.006	.258**	.294**	.058				
e14	.194**	.233**	.424**	.218**	.254**	.411**	.284**	.241**	.122*	.369**	.292**	.159*	.465**			
e15	.241**	.161**	.240**	.319**	.400**	.489**	.333**	.169**	.130*	.384**	.263**	.180**	.332**	.457**		
e16	.256**	.267**	.294**	.232**	.204**	.108	.224**	.214**	.312**	.317**	.421**	.316**	.126*	.226**	.326**	

It should also be emphasized that the fact that data collection was tailored to the final period of COVID-19, since the older person were one of the most vulnerable to SARS-CoV-2, where people living in nursing homes were subject to restrictive mobility measures, certainly affected the results obtained in this study.

The practical implications of this study will allow the use of FES#FC in the context of nursing homes by formal carers, for carer training and fall prevention interventions would increase the relevance of the study results for health professionals and policy makers. In the future, we could also consider exploring formal carers' fear of falls, but on a longitudinal basis, in order to verify the effectiveness of interventions aimed at mitigating this fear.

The limitations of the present study included the fact that sample selection was not random, and data were collected in the regions of Lisbon and the Tagus Valley, which are not representative of the country. In order to solve this problem, it is recommended that future studies replicate confirmatory factor analysis in other samples that consider the various regions of Portugal. Another limitation was the fact that the study was carried out during one period only, which hindered the researchers from verifying the stability of the measurements. Therefore, future studies should include test-retest procedures to confirm the stability of the data provided by FES#FC. Another potential source of limitation could be the characteristics of the care providers or organizational factors in the nursing homes, which could have led to bias or confounding factors that could have influenced the results, such as the existing guidelines in fall prevention, the type of leadership and support given by management and health professionals to informal carers when a fall occurs.

Conclusion

The study provided support the validity of the Falls Efficacy Scale – Formal Caregivers instrument by showing a proper fit for a three-dimensional model (lesser physical effort activities; intermediate physical effort activities, carried out in safe conditions; and intermediate physical effort activities, carried out in less safe conditions), with adequate convergent validity. The instrument had satisfactory internal consistency regarding assessment of fear of falling. In summary, the Falls Efficacy Scale – Formal Caregivers proved reliable and valid to measure the fear of falling experienced by caregivers who assist older people living in nursing homes.

The adaptation of the FES#FC to institutionalized older people and its use can help improve management of measures to be prescribed to reduce risk of falls.

Declaration of competing interest

There are no conflicts of interest related to this article.

CRediT authorship contribution statement

Cristina Lavareda Baixinho: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Cristina Marques-Vieira:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Methodology, Investigation, Formal analysis, Data curation. **António Abrantes:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Data curation. **Amaro Martins:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation. **Maria Adriana Henriques:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Methodology, Investigation, Funding acquisition, Formal analysis,

Conceptualization. **Maria dosAnjos Dixe:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Methodology, Investigation, Formal analysis, Conceptualization.

Ethics approval and consent to participate

The study was conducted according to the guidelines of the Declaration of Helsinki and was approved by the ethics committee at the Leiria Polytechnic Institute per protocol no CE/IPLEIRIA/46/2020. The study was authorized by the institutions, and the participants were asked to sign free and informed consent forms.

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