Original Article

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VALIDATION OF THE INTERNATIONAL 7-ITEM FALLS EFFICACY SCALE IN PORTUGUESE COMMUNITY-DWELLING OLDER ADULTS

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ABSTRACT

Objective: to determine the psychometric properties of the international 7-item Falls Efficacy Scale.
Method: a psychometric study. Convenience sample consisting of 170 older adults living in the Madeira Autonomous Region, Portugal. A two-part instrument was used (sociodemographic characterization and the Falls Efficacy Scale-International-Portugal). The starting point was the translation and transcultural adaptation already carried out for the Falls Efficacy Scale – International (16 items). Construct validity (factorial analysis and discriminant validity) and the reliability (Cronbach's α) of the 7-item scale were evaluated. Previous authorization was obtained from the Ethics Commission and from the people involved.
Results: in the exploratory factorial analysis, the International 7-item Falls Efficacy Scale presents an explained variance of 65.8%. The Spearman's correlation between the score obtained based on the 7 items and the score obtained based on the 16 items is significant and very strong ($r=0.987$, $p<0.0001$). Internal consistency was 0.958.
Conclusion: the validity and reliability study of the International 7-item *Falls Efficacy Scale* revealed that it is an adequate scale for the evaluation of the fear of falling in the community-dwelling older adults.

DESCRIPTORS: Validation studies. Fear. Fall-related accidents. Risk factors. Older adult.

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VALIDAÇÃO DA *FALLS EFFICACY SCALE* INTERNACIONAL 7 ITENS EM IDOSOS PORTUGUESES RESIDENTES NA COMUNIDADE

RESUMO

Objetivo: determinar as propriedades psicométricas da *Falls Efficacy Scale* Internacional 7 itens.
Método: estudo psicométrico. Amostra de conveniência, de 170 idosos residentes em Região Autónoma da Madeira, Portugal. Recorreu-se a instrumento constituído por duas partes (caracterização sociodemográfica e a *Falls Efficacy Scale* Internacional Portugal). Partiu-se da tradução e adaptação transcultural já realizada para a *Falls Efficacy Scale* Internacional (16 itens). Avaliou-se a validade de constructo (análise fatorial e validade discriminante) e a confiabilidade (α de Cronbach) da escala de 7 itens. Obteve-se previamente autorização da Comissão de Ética e das pessoas envolvidas.
Resultados: na análise fatorial exploratória a *Falls Efficacy Scale* Internacional 7 itens apresenta uma variância explicada de 65,8%. A correlação de Spearman entre a pontuação obtida com base nos 7 itens e a pontuação obtida com base nos 16 itens é significativa e muito forte ($r=0.987$, $p<0.0001$). A consistência interna foi de 0,958.
Conclusão: o estudo da validade e a confiabilidade da *Falls Efficacy Scale* Internacional 7 itens revelou ser uma escala adequada para a avaliação do medo de cair na pessoa idosa residente na comunidade.

DESCRITORES: Estudos de validação. Medo. Acidentes por quedas. Fatores de risco. Idoso.

VALIDACIÓN DE LA ESCALA *FALLS EFFICACY SCALE* INTERNACIONAL DE 7 ÍTEMS EN ANCIANOS PORTUGUESES RESIDENTES EN LA COMUNIDAD

RESUMEN

Objetivo: determinar las propiedades psicométricas de la escala *Falls Efficacy Scale* Internacional de 7 ítems.
Método: estudio psicométrico. Muestra por conveniencia de 170 ancianos que viven en la Región Autónoma da Madeira, Portugal. Se empleó un instrumento constituido por dos partes (caracterización sociodemográfica y la escala *Falls Efficacy Scale* Internacional - Portugal). Se partió de la traducción y adaptación transcultural ya realizada de la escala *Falls Efficacy Scale* Internacional (16 ítems). Se evaluó la validez de constructo (análisis factorial y validez discriminante) y la confiabilidad (α de Cronbach) de la escala de 7 ítems. Previamente se obtuvo la autorización de la Comisión de Ética y de las personas involucradas.
Resultados: en el análisis factorial exploratorio, la escala *Falls Efficacy Scale* Internacional de 7 ítems presenta una varianza explicada del 65,8%. La correlación de Spearman entre la puntuación obtenida sobre la base de los 7 ítems y la obtenida sobre la base de los 16 ítems es significativa y muy fuerte ($r=0,987$, $p<0,0001$). La consistencia interna fue de 0,958.
Conclusión: el estudio de la validez y la confiabilidad de la escala *Falls Efficacy Scale* Internacional de 7 ítems reveló que es una escala adecuada para evaluar el miedo a caer en el anciano que vive en la comunidad.

DESCRIPTORES: Estudios de validación. Miedo. Accidentes por caídas. Factores de riesgo. Anciano.

INTRODUCTION

The fear of falling is one of the etiologies of the "risk of falling" and "frailty" Nursing diagnoses,[1] being a related determinant factor especially in the older adults.[2–3]

In recent decades there has been a steady increase in people's longevity, and associated with the older adults comes the condition of vulnerability.[4] These changes challenge Nursing, especially in the sense of implementing preventive Nursing interventions. The "risk for falls" is identified as a Nursing diagnosis, either in the International Classification for Nursing Practice (ICNP®),[5] or in NANDA-International.[1] This is defined as "vulnerability for greater susceptibility to falls, which can cause physical damage and compromise health".[1] "Frailty" is in turn defined as "Dynamic state of unstable equilibrium that affects the older adults who undergoes deterioration in one or more health domains (physical, functional, psychological or social) and leads to increased susceptibility to adverse health effects, in particular disability"[1], or its risk, when it is considered that there is susceptibility to the phenomenon in question.

These Nursing diagnoses have received increasing attention, due to their association with the quality of life[6] and the functionality of the older adult. Although falls are a multidimensional and multi-factorial phenomenon, fear of its occurrence has a negative impact on the older adults, especially those who are at high risk and/or have suffered recurrent falls[6–11], leading to their institutionalization[9–10], even when there is no history of falling[9], contributing to the increase in the consumption of health resources and expenses with the treatment of the consequences of the post-fall syndrome.[11]

The research results also show that, in situations where a fall episode occurs, the older adults, for fear of a new fall, impose, or see imposed on them, restrictions on the activity that promotes dependence.[7] The post-fall syndrome, which includes fear of its recurrence, is of concern to the older adult population, being considered a risk factor for the reduction of mobility, the ability to perform activities of daily living, and decreased perception of the health status and of quality of life.[12]

Fear is not quantifiable if it is not emphasized, communicated by the older adult or evaluated by the health professionals. The fact that it is imperceptible leads the older adults to gradually avoid or be led to avoid a set of activities, with a consequent reduction in their functional skills and deterioration of cognitive ability, and these losses also become risk factors for future falls.[7]

Failure to evaluate the fear of falling prevents the introduction of measures to prevent the risk for falls, reduces participation in daily life activities, increases periods of immobility due to insecurity in relation to the ability to maintain balance and walk safely, and is also a predictor of dependence and increased risk for falls.[2–3,7]

Thus, in the context of the clinical practice, nurses must systematically assess the "fear of falling" of older adults, using scales adapted and culturally validated, to guarantee the reliability and validity of the results.[8,13]

The objective of this study was: to determine the psychometric properties of the International 7-item Falls Efficacy Scale, Portugal, in a sample of community-dwelling older adults.

METHOD

This is a cross-sectional methodological study to determine the psychometric properties of the FES-I (7 items),[14–16] carried out at the Health Centers of the Health Service of the Madeira Autonomous Region (*Serviço de Saúde da Região Autónoma da Madeira*, SESARAM), Public Business Entity (*Entidade Pública Empresarial*, EPE).

In Portugal, the scale validated to assess fear of falling in older adults, living in their homes, is the Falls Efficacy Scale-International (FES-I) - Portugal, with 16 items.[9] Its evolution to 7 items (FES-I 7 items), was mainly due to the reduction in the time used to complete it, with some authors arguing that the use of a reduced version of the scale increases adherence to its use, maintaining sensitivity and specificity.[14–15]

In the adaptation and validation in other countries, the reduced version with 7 items was achieved, highlighting only 7 questions of the scale that gave rise to it, which are: "Getting dressed or undressed" (2), "Taking a bath or shower" (4), "Getting in or out of a chair" (6), "Going up or down stairs" (7), "Reaching for something above your head or on the ground" (9), "Walking up or down a slope" (15), and "Going out to a social event (e.g. religious service, family gathering or club meeting)" (16).[14–15] Regarding their assessment, it is expected that the older adults will position themselves in each question, between 1 to 4, which is equivalent to "not at all concerned", "a little concerned", "very concerned" and "extremely concerned".[8,14] This gives a result between 7 and 28.[15]

For the cultural adaptation of the reduced version of FES-I (7 items) to the Portuguese language, a sample of older adults living in 10 municipalities (10 Health Centers in the municipality) was selected, representing a total of 40 Health Centers), through a non-probabilistic, convenience process.

The inclusion criteria were the following: people aged 65 or over who needed Nursing care and went to the Health Centers of the SESARAM, EPE, from May 18th to June 14th, 2015. In data collection data, an instrument consisting of two distinct parts was used, namely: (1) sociodemographic characterization; and (2) FES-I – Portugal (16 items), which includes FES-I (7 items).

To validate a scale, it is necessary to have a minimum of ten individuals per item to be validated;[13] since FES-I has 7 items, a minimum sample of 70 people is needed to meet the request.

There was a face-to-face meeting at the 10 municipal health centers, three months before, with as many of the nurses involved as possible, where necessary information was left. During the study, contact was maintained, in order to answer any doubts that had arisen.

The Generalist Nurses (GNs) who provided direct care to the older adults in that time interval would be the ones who collaborated in filling out the instrument. When the older adults were unable to perform certain activity, for example, attending a social event, it was foreseen that, during the filling out of the instrument, the nurse would ask them to imagine this activity and take a position regarding his concern about the possibility of falling, on a scale between 1 and 4.

Authorization was obtained from the Ethics Committee in December 2014 to conduct the study at the SESARAM, EPE (Protocol No. 43/2014) and by the author of the FES-I scale, Lucy Yardley, as well as the title to be attributed in the Portuguese version (FES-I Portugal). Each collaborator (GN) and each participant (older adult), after being informed, was requested to sign a consent form in the form of an informed consent, ensuring confidentiality, as well as the possibility of withdrawal without harms to themselves.

The evaluation tools were applied independently and returned by mail in an opaque envelope, previously provided and duly filled in, with no postage costs.

The insertion of data in the table was done by two individuals: one took care of the digitization and the other of its validation. The data were processed using the SPSS program, version 24.0. The translation and cultural adaptation study was carried out, in another study previously conducted, by some authors of the present study.[8]

For the reliability study, Cronbach's α was used. As in FES-I Portugal, a minimum value of 0.70 was adopted, considered as reasonable internal consistency.[13] Construct validity was performed through factorial analysis and discriminant validity. The evaluation of the internal structure of FES-I (7 items) - Portugal was carried out by Exploratory Factorial Analysis (EFA). This option met the target population of the study because it has different particularities from that in which the scale was originally validated.[14] The main factor method was used to estimate the loadings, with orthogonal rotation of the factors according to the varimax method. Suitability was assessed using the Kaiser-Meyer-Olkin (KMO) criterion and Bartlett's sphericity test. Concurrent validity was obtained through Spearman's correlation between the scores of FES-I (16 items) and FES-I (7 items).

Discriminant validity was analyzed by gender, age, history of falls, daily medication consumption, impaired balance, impaired sight, impaired audition, decreased health status and altered mental health, in order to meet what was done in other countries studies.[2,8–9,17] These variables were extracted from the clinical process of the older adults. The Mann-Whitney's U test was used, since the hypothesis of normality of the FES-I (7 items) values was rejected.

Sensitivity and specificity were used to verify whether FES-I (7 items) - Portugal would be able to correctly discriminate older adults with: history of falls (regardless of the number of falls); fear of falling; impaired balance; impaired sight; daily consumption of medication; impaired audition; decreased health status and altered mental health.

To identify the ideal criterion and the overall effectiveness of the classification system, the Receiver Operating Characteristic (ROC) curve[18] was used through the *MedCalc*® statistical program. A ROC Area Under the Curve (AUC) of 0.50 means that the model is not capable of discriminating against older adults at risk of falling, whereas an AUC of 0.70 is generally considered to be moderate and an AUC of 0.80 is high, which indicates that the scales can rank and perform well.[19] The best cutoff point was found using the ROC curve, and the definition of the predictive validity of the scale was based on the calculation of sensitivity and specificity, of the ROC AUC and, also, in the Youden index (J), which was the option chosen in the validation of the FES-I scale in Portugal.[8] The cutoff point was determined from the best index obtained.[20] A significance level of 0.05 was adopted.

RESULTS

The sample consisted in 170 older adults who met the eligibility criteria. The mean age of the sample was 73.1 years old (±7.9 years old) and 81.2% were female. 75.3% presented a previous history of falls, of which 40.4% fell once in the last year and 28.1% more than once.

The internal consistency of the Portuguese version of the 7-item FES-I is α=0.958.

Regarding the study of construct validity, it was performed through exploratory factorial analysis, with the extraction of factors made by the principal components method, having obtained KMO = 0.891, with $p<0.0001$, for Bartlett's sphericity test. In this sense, it was possible to continue the analysis.

Table 1 shows the factorial load associated with each question. Factorial loads over 0.5 are considered significant. All items have factorial weights greater than 0.775 and all fit a dimension. The percentage of variance explained, by the single factor, was 65.8%, with an own value greater than 1 (4.609).

The correlations between the 7 items were also calculated, obtaining a minimum value of 0.448 and a maximum of 0.695. The correlation between each of the 7 items and the global score varied between 0.737 and 0.866, demonstrating internal validity (Table 2).

Table 1 – Factorial load (*Loadings*) associated with each item of the 7-item FES-I. Madeira Autonomous Region, Portugal, 2015. (n=170)

Items	F1 *Loadings*	h^2
FES I (2): Getting dressed or undressed	0.784	0.614
FES I (4): Taking a bath or shower	0.805	0.649
FES-I (6): Getting in or out of a chair	0.851	0.724
FES-I (7): Going up or down stairs	0.848	0.719
FES-I (9): Reaching for something above your head or on the ground	0.783	0.613
FES-I (15): Walking up or down a slope	0.775	0.600
FES-I (16): Going out to a social event (e.g. religious service, family gathering or club meeting)	0.831	0.690
Own value	4.609	
% of Explained variance	65.839	

Table 2 – Spearman's correlations between the 7 items of FES-I. Madeira Autonomous Region, Portugal, 2015. (n=170)

Items	Global Score, 7 items	FES-I (2)	FES-I (4)	FES-I (6)	FES-I (7)	FES-I (9)	FES-I (15)
FES-I (2)	0.737*						
FES-I (4)	0.791*	0.637*					
FES-I (6)	0.815*	0.695*	0.630*				
FES-I (7)	0.866*	0.528*	0.629*	0.653*			
FES-I (9)	0.792*	0.469*	0.544*	0.648*	0.651*		
FES-I (15)	0.799*	0.458*	0.487*	0.531*	0.667*	0.595*	
FES-I (16)	0.828*	0.626*	0.590*	0.611*	0.676*	0.538*	0.658*

*p< 0.0001.

Regarding concurrent validity, Spearman's correlation between the score obtained on the scales based on the 7 items (FES-I 7) and the 16 items (FES-I 16) is significant, positive and very strong (r=0.987, p<0.0001). They demonstrate that the two scales evaluate the same construct.

As for discriminant validity, the following variables were worked on: gender, age, history of falls, fear of falling, impaired balance, impaired sight, impaired audition, decreased health status and altered mental health (Table 3).

The scale can discriminate by age, history of falls, fear of falling, impaired balance, impaired sight and decreased health status (corrected p-value <0.05). Fear of falling was increased in people over the age of 75, with a history of falls, in those who referred to fear of falling, had impaired balance, impaired sight and perceived decreased health status.

The results of the predictive validity of FES-I (7 items) - Portugal are shown in Table 4. FES-I (7 items) presents good performance, since it has a moderate capacity to predict history of falls, impaired vision and decreased health status, as well as high capacity to predict fear of falls and impaired balance.

Table 3 – Discriminant validity of the 7-item FES-I. Madeira Autonomous Region, Portugal, 2015. (n=170)

Variables	Mean values of the 7-item FES-I		Mann-Whitney's U Test	p-value	Corrected p-value*
Gender	Male (n=32) 15 (9-21)	Female (n=138) 15 (11-21)	2,147.0	0.808	0.808
Age	≤ 75 years old (n=117) 14 (10-20)	≥ 76 years old (n=53) 17 (12-23)	3,773.5	0.023	0.034
History of falls	Yes (n=128) 16 (12-22)	No (n=42) 12 (8-17.5)	3,275.5	<0.0001	<0.0001
Fear of falling	Yes (n=125) 17 (14-22)	No (n=35) 9 (7-12)	3,806.5	<0.0001	<0.0001
Impaired balance	Yes (n=91) 19 (15-24)	No (n=69) 11 (8-14)	5,337.5	<0.0001	<0.0001
Impaired sight	Yes (n=93) 17 (13-22)	No (n=67) 13 (9-19)	4,210.5	<0.0001	<0.0001
Impaired audition	Yes (n=51) 16.5 (13-22)	No (n=109) 14 (10-20)	3,263.0	0.077	0.099
Decreased health status	Yes (n=82) 19 (14-23)	No (n=78) 12 (9-16)	4,808.5	<0.0001	<0.0001
Change in mental health	Yes (n=25) 20 (14-22)	No (n=135) 15 (11-22)	2,042.5	0.095	0.107

*Corrected p-value for multiple tests, by the Benjamini-Hochberg method.

Table 4 – Predictive validity of the 7-item FES-I. Madeira Autonomous Region, Portugal, 2015. (n=170)

Variables	ROC AUC (95% CI)	Cutoff point in the score of the 7-item FES-I	Sensitivity % (95% CI)	Specificity % (95% CI)	Youden Index (J)	p-value
History of falls	0.693 (0.618 - 0.761)	> 21	32.03 (24.1 - 40.9)	97.62 (87.4 - 99.9)	0.2965	<0.0001
Fear of falling	0.870 (0.808 - 0.918)	> 14	68.00 (59.1 - 76.1)	94.29 (80.8 - 99.3)	0.6229	<0.0001
Impaired balance	0.850 (0.785 - 0.902)	> 15	71.43 (61.0 - 80.4)	84.06 (73.3 - 91.8)	0.5549	<0.0001
Impaired sight	0.752 (0.677 - 0.817)	> 15	67.07 (55.8 - 77.1)	73.08 (61.8 - 82.5)	0.4015	<0.0001
Impaired audition	0.587 (0.506 - 0.664)	> 12	78.43 (64.7 - 88.7)	38.53 (29.4 - 48.3)	0.1696	0.0628
Decreased health status	0.752 (0.677 - 0.817)	> 15	67.07 (55.8 - 77.1)	73.08 (61.8 - 82.5)	0.4015	<0.0001
Change in mental health	0.605 (0.525 - 0.681)	> 19	52.00 (31.3 - 72.2)	73.33 (65.0 - 80.6)	0.2533	0.0937

DISCUSSION

The purpose of this study was to validate the short version of FES-I (7 items) Portugal, in order to verify its validity and internal reliability. The sample is mostly made up of females (81.2%), with a mean age of 73.1 years old (±7.9 years old) and with a previous history of falls (75.3%), of which 40.4% occurred in the last year.

This scale has already been translated into several languages having cultural equivalence,[9] following a cross-cultural validation protocol.[14] Currently, there are Brazilian[18] and European Portuguese versions.[8,21]

In this study, the scale presents good psychometric properties, meeting the results of other studies that document the excellent reliability and validity of FES-I[8–9,14,21] and of its short version, FES-I (7 items),[22] in community-dwelling older adults.

The correlation between the 16 item FES-I version and the 7-item FES-I short version was very high (r=0.987), showing equivalence in construct validity. In this sense, the short version was considered an excellent instrument to assess the fear of falling in community-dwelling older adults.

In this study (Table 3), FES-I (7 items) presented ability to discriminate the older adults by age, history of falls, general perception of fear of falling, impaired balance, impaired sight and decreased health status. In previous studies, it was verified that, in people with higher scores on FES-I, there was history of falls.[17,23–24] However, there was no confirmation regarding gender as found in other studies.[2–3,15,23–25]

A score equal to or greater than 15 on the FES-I scale (7 items), applied to the community-dwelling older adults, allowed predicting fear of falling in general, impaired balance, impaired sight and decreased health status. Thus, in addition to the general perception of fear of falling, this scale has the ability to predict some factors associated with the risk of falling for the community-dwelling older adults.[26]

With the validation of FES-I (7 items) - Portugal, it is intended to provide a scale to support decision-making in the context of the clinical practice, referring to the “fear of falling” in the community-dwelling older adults. The phenomenon is present as a related/risk factor for some Nursing diagnoses, namely: “risk for falls”, “frailty” and “risk of syndrome of the frail older adult”.[1]

It should be noted that fear of falling has been reported in other research studies, which is present and has an impact on self-care, physical and mental health, and socialization, as well as on Quality of Life, due to the restriction that the older adult places on mobility.[27–28]

On the other hand, it is not a common practice for the health professionals to deal with the fear of falling by the community-dwelling older adults, which makes this risk factor remain undervalued and unnoticeable, and no interventions are planned in time to prevent the reduction of physical capacity and cognitive decline, which are configured as risk factors for future falls.[7]

It is intended to contribute, in particular, to more accurate Nursing diagnoses and, consequently, to clinical reasoning. On the one hand, objectively assessing the fear of falling, it is possible to, for example, detect the “Syndrome of the frail older adult”, or the “Risk for falls”. On the other hand, validation makes it possible to individualize interventions for the older adult with fear of falling, reducing the prevalence of falls and, simultaneously, the injuries resulting from them. The Nursing intervention, in the etiology of “fear of falling” associated with physical exercise,[29] will have a positive physical and cognitive impact. In this way, quality of life is increased, especially in the older adults with a history of falls.

The validation of the reduced version of the FES can increase the professionals’ adherence to their application of the scale and the introduction of measures, which prevent fear of falling from becoming an etiological factor of other conditions such as immobility, dependence, institutionalization and deterioration in quality of life in the older adult population, especially in the most vulnerable. It is not possible to control this public health problem without the active involvement of the teams[30], which include the objective assessment of risk factors and the training of the older adult population to adhere to safety behaviors.

The study limitations include the following: its cross-sectional design, the sample size as well as its composition, since 138 participants are female and only 32 participants are male.

CONCLUSION

The short version of FES-I (7 items) - Portugal is a clear and understandable scale and is considered valid and reliable to assess fear of falling in community-dwelling older adults, with a value equal to that of the 16 item version. As for psychometry, it is noteworthy that a sample of 170 older adults, for a scale with 7 items, allowed for the use of robust tests.

The possibility of nurses being able to intervene in a timely manner, in the “fear of falling” etiology, associated with the “risk for falls” or “Syndrome of the frail older adult” Nursing diagnoses, will have a positive impact at the physical and cognitive level. Thus, the quality of life of older adults with vulnerability to history of falls is increased.

For the future, it is recommended to validate this scale in other contexts, namely hospitalized older adults, in residential institutions for older adults.

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NOTES

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CONFLICT OF INTEREST

There is no conflict of interests.

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