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Review article

Cross-cultural validation of the falls efficacy scale international in elderly: Systematic literature review

Cristina Maria Alves Marques-Vieira, MSc CRRN [a], Luís Manuel Mota Sousa, MSc CRRN [b, c], Sandy Severino, MSc CRRN [c, *], Lisete Sousa, PhD [d], Sílvia Caldeira, PhD MSc RN [a]

[a] School of Nursing – Lisbon, Institute of Health Sciences, Universidade Católica Portuguesa, Lisbon, Portugal
[b] Universidade Atlântica, Lisbon, Portugal
[c] Hospital Curry Cabral, Centro Hospitalar Lisboa Central, Entidade Pública Empresarial (EPE), Lisbon, Portugal
[d] Department of Statistics and Operations Research and CEAUL (Projeto FCT projecto PEst-OE/MAT/UI0006/2014), Faculty of Sciences, Universidade de Lisboa, Lisbon, Portugal

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ABSTRACT

The aim of this study is to describe the psychometric properties of cultural adaptations of the Falls Efficacy Scale International (FES-I) in the elderly dwelling in the community. A systematic literature review was performed according to the research question: What are the psychometric properties of the FES-I in the elderly dwelling in the community in different cultural backgrounds? The Population, Interest, Context (PICo) strategy was used for inclusion criteria—Population: elderly; Interest area/intervention: psychometric properties of the FES-I; Context: dwelling in the community in various cultural settings. The sample was made up of 10 articles. Metric properties have been evaluated by the criteria of validity, reproducibility, reliability, and responsiveness. The FES-I is considered acceptable, understandable to measure the fear of falling in the elderly, valid, reliable, and comparable cross-culturally, so it is recommended in rehabilitation research, clinical trials, clinical practice, and in fall-prevention programs in elderly.

1. Introduction

The increased longevity of people poses new challenges to health policies and scientific research priorities. Population aging is a reality ever more present in most countries, leading transitions of society itself.

The increasing number of elderly favors discussion with regard to impairments related to this age group, which highlights the occurrence of falls.[1] It is understood as an unintended drop event, which results in changing the individual position, to a lower level in relation to its initial position.[2]

In a study performed in Brazil,[3] the prevalence of a fall in a 6-month period was 33.3% in a sample of 240 elderly people who lived in the community, of whom 25% had one or two falls and 6.3% had three or four falls. The greatest fall prevalence was found in women, the elderly, and the young, and most occurred in the yard and in the bathroom. The intrinsic factors that stood out in the cause of the falls in the elderly were altered balance, muscle weakness, dizziness/vertigo, and difficulty in walking. The extrinsic factors were: slippery surfaces, uneven floors or holes, high step and/or tread gap, objects on the floor, and throw rugs. Regarding the consequences, the elderly reported fear of falling again, anxiety, and depression.[3] Nurses need to be aware of the physical and physiological changes that come from the aging process, understanding the fragility of the elderly, but also possible changes in family dynamics. It is important to know how the elderly feel in their context because a situation of dependence and reduced functional capacity can have an impact on people's lives as it involves biological, physical, emotional and social issues.[4] Reduced muscle strength and flexibility associated with aging, as well as postural changes, may lead to the fear of falling, even though they had never experienced a fall.[5] The fear of falling causes a loss of confidence in performing daily tasks, restrictions on social

* Corresponding author. Intensive Care Unit – UCIP 7, Hospital Curry Cabral, Centro Hospitalar Lisboa Central, Entidade Pública Empresarial (EPE), Rua da Beneficência, n.º 8, 1069-166 Lisboa, Portugal.
E-mail address: sandyseverino@gmail.com (S. Severino).

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activities, and increased dependence that can lead to deconditioning.[6] Research demonstrates that the intensity of the fear of falling is associated with physical frailty, the decline in activities of daily living (ADL), and a history of previous falls. The fear of falling is a predictor of institutionalization in nursing homes, both in people who have fallen and in those who have never fallen.[5]

The falls efficacy scale (FES) was developed to evaluate the fear of falling while carrying out 10 tasks related to ADL.[7] In 2005 the FES international (FES-I) was developed with 16 items, because the FES of Tinetti et al[7] did not represent a direct relationship between the fear of falling and self-efficacy.[8] Items in the FES are related to basic ADL, mostly related to vulnerable elderly, and do not evaluate the fear of falling when in social activities or life. Due to these criticisms, neither the items in the original FES, nor the rating scale, whose terms were substituted *confident* with *worried* were kept.[5] The 16 FES-I items are: cleaning the house (e.g., wiping with a cloth, vacuuming, or dusting); dressing or undressing; preparing simple meals; bathing or showering; shopping; sitting or rising from a chair; walking up or down stairs; walking in the neighborhood; taking something above the level the head or from the ground; picking up the phone; walking on a slippery surface (e.g., wet ground); visiting a friend or relative; walking in crowded places; walking on an uneven surface (with stones or holes) up or down a slope; and attending a social event (e.g., religious act, family gathering, or club meeting).[9] The total score varies between 16 (not worried) and 64 points (very worried).[8]

Using a culturally adapted and validated instrument of measurement in research ensures the reliability of results,[10–12] but also contributes to clinical reasoning and to an accurate nursing diagnosis.

The objective of the study is to describe the psychometric properties of FES-I in the elderly dwelling in the community when submitted to cultural adaptations. The purpose is to contribute to the knowledge about the instrument and its cultural adaptation in different countries, which will enable the comparison of studies regarding the fear of falling in the elderly residing in a community context.

2. Methods

A systematic literature review was conducted to identify, select, evaluate, in a critical way, and synthesize research evidence in order to solve a certain problem of a particular clinical practice, defined for the sake of concrete research.[13–15]

The guidelines of the Joanna Briggs Institute[16] were considered from the PICo strategy for a research question, which was defined as: what are the psychometric properties of the FES-I in elderly residents in different cultural settings? Each dimension of PICo contributed to the definition of the inclusion criteria—Population: elderly; Interest area/intervention: psychometric properties of the FES-I; and Context: dwelling in the community in various cultural settings. The search was conducted in April 2015 in EBSCOhost platform, in the databases MEDLINE Complete and CINAHL Complete. The descriptors were validated on the platform Descriptors of Health Sciences (DESC) with the following search strategy: (v) AND (reliability) AND (accidental falls) AND (FES-I OR falls efficacy scale international).

The search of the terms was limited to an abstract. Studies published in the past 10 years were included, particularly those published from January 2005 (1st publication of the FES-I) to January 2015. Studies in Portuguese, English, and Spanish, available in full text and with cohort and/or descriptive quantitative design were included. Studies that did not present at least one psychometric property (reproducibility, validity, and responsiveness) were excluded. The search was conducted independently by two researchers and the selection of studies followed the same method, with the sequence suggested by the international guidelines of Prisma.[17] The agreement between researchers was taken into account. To allow assessment of the viability criteria, appropriateness, significance, and effectiveness, the Joanna Briggs Institute criteria were applied regarding cohort studies and descriptive studies in order to support the decision-making of items to include in the systematic literature review.[16] No article was excluded at this stage (Figure 1), because all had at least 75% of the criteria.[16]

The criteria of the Registered Nurses' Association of Ontario[18] were considered for the classification of the levels of evidence of each paper.

In evaluating the metric properties of the rating scales of the risk of falling the validity criteria (content, construct, concurrent and discriminant), reproducibility (inter- and intraobserver) and reliability (internal reliability) and responsiveness were used.[10–12]

3. Results and discussion

Of the 10 articles that compose this sample, the country of origin was identified as: UK[8]; Germany, The Netherlands, and the UK[19];

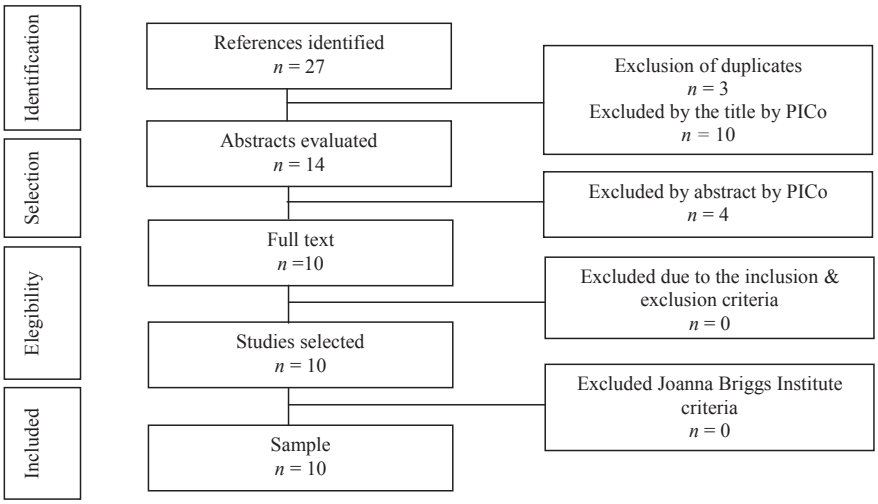

Figure 1. Identification, analysis and selection of the articles.

Sweden[20]; Italy[21]; Brazil[9]; Australia[22]; Greece[23]; Turkey[24]; China[25]; and Iran,[26] all with one paper. One was published in each of 2005,[8] 2007,[19] 2011,[23] and 2012,[24] and two in 2009,[20,21] 2010,[9,22], and 2013.[25,26] Most used quantitative methodology, of which nine are cohort studies[8,9,19,21–26] and one is descriptive.[20] Of the studies analyzed (Table 1), all present an evidence level of III.[8,9,19–26]

The results of this systematic literature review concluded that the FES-I presents internal consistency and is considered good to excellent test–retest reliability in the various transcultural versions.[8,9,19–26] Cronbach α of the original version (0.96)[8] is comparable with versions of Germany (0.90),[19] The Netherlands (0.96),[19] UK (0.97),[19] Sweden (0.95),[20] Italy (0.97),[21] Brazil (0.93),[9] Australia (0.79),[22] Greece (0.92),[23] Turkey (0.94),[24] China (0.94),[25] and Iran[26] in the self-reporting questionnaire (0.93) and interview (0.92). Internal reliability classified as excellent[10,11] or good[12] (highest rating). In the test–retest, the ICC's original version is excellent (0.96)[8] and other versions adapted to Germany (0.79),[19] The Netherlands (0.82),[19] Brazil (0.84),[9] Greece (0.95),[23] Turkey (0.94),[24] China (0.89),[25] and Iran[26] self report of self-reporting (0.84) and interview (0.84). Interevaluator reliability tested only in versions from Brazil (0.91),[9] China (0.95),[25] and Iran (0.94)[26] proved to be excellent[10,11] or good[12] (highest rating). In versions from Brazil[9] and Iran[26] the self-reporting mode had a lower reliability than the interview mode due to the degree of illiteracy.

In content validity versions from Sweden,[20] Italy,[21] Brazil,[9] Greece,[23] Turkey,[24] China,[25] and Iran[26] the results presented semantic and linguistic consensus (translation and back translation), and the versions were considered adequate and understandable. In the Chinese version 25, item 10 was changed and in item 16 the word *social* was removed as it was considered inappropriate.

In regard to construct validity, the Swedish[20], Portuguese Brazilian,[9] Turkish,[24] Chinese,[25] and Iranian versions,[26] the factor analysis, performed with the parameters used in the initial validation of the FES-I,[8] showed similar factor loads, and a single factor was confirmed. However, in the bifactorial solution, some differences were found in different versions, in which some items have been placed on different factors. Factor 2 in FES-I original[8] consisted of Items 8, 9, 11, 13, 14, and 15; in the Swedish[20] version of Items 7, 8, 11, 14, and 15; in the Portuguese Brazilian[9] of Items 7, 11, 14, and 15; in Turkish[24] of Items 4, 11, and 14, and were related to the fear of slipping during activities; and the Chinese[25] version included Items 7,11,13,14, and 15.

The FES-I's ability to discriminate based on various levels of fear of falling (FOF) was observed in studies in the versions of: Germany,[19] The Netherlands,[19] UK,[19] Greece,[23] Turkey,[24] China,[25] and Iran[26]. The FOF levels were higher in women than in men in various cultures, such as in The Netherlands,[19] Australia,[22] Turkey,[24] China,[25] and Iran[26]. However, female sex did not always achieved

Table 1
Main results and conclusion of the 10 studies.

Authors, year, country, & population	Results			Conclusions
	Reproducibility	Validity	Responsiveness	
Yardley et al,[8] 2005, UK, $n = 704$	Internal reliability[a]; Test–retest[b,c]	Construct[g]; Discriminant		Valid & reliable
Kempen et al,[19] 2007, Germany (A, $n = 94$), The Netherlands (B, $n = 193$), & UK (C, $n = 178$)	Internal Reliability (A, B, C)[a]; Test–retest (A, B)[b,d]	Content; Discriminant	f	Valid & reliable; Comparable
Nordell et al,[20] 2009, Sweden ($n = 86$)	Internal reliability[a]	Content; Construct[g]; Concurrent (SF12)[d]		Valid & reliable; Comparable
Ruggiero et al,[21] 2009, Italy ($n = 157$)	Internal reliability[a]; Test–retest[b,d]	Content; Internal; Convergent (SFES-I)[d]		Valid & reliable; Comparable
Camargos et al,[9] 2010, Brazil ($n = 163$)	Internal reliability[a]; Test–retest[b,d]	Content; Construct[g]; Discriminant[e]		Valid & reliable; Comparable
Delbaere et al,[22] 2010, Australia ($n = 500$)	Internal reliability[a,c]	Construct Discriminant[e]		Valid & reliable
Billis et al,[23] 2011, Greece ($n = 89$)	Internal reliability[a]; Test–retest[b,c]	Content; Construct (SF-36, GHQ30, TUG, FRT)[c]; Concurrent (CONFBal)[c]; Discriminant[e]	f	Valid & reliable; Comparable
Ulus et al,[24] 2012, Turkey ($n = 70$)	Internal reliability[a]; Test–retest[b,c]	Content; Construct[g]; Convergent (MBI, BBS, TUG)[c]; Discriminant[e]		Valid & reliable; Comparable
Kwan et al,[25] 2013, China [Hong Kong ($n = 200$) & Sydney ($n = 199$)]	Internal reliability[a]; Test–retest[b,d]	Content; Construct[g]; Convergent (GDS15,[c] IADL,[c] SF12,[c] TUG,[c] NTS,[c] SFES-I[d])[d]		Valid & reliable; Comparable
Baharlouei et al,[26] 2013, Iran ($n = 191$)	Internal reliability[a]; Test–retest[b,d]	Content; Construct/; Convergent (SF36, TUG, FRT)[d]	Ceiling & floor effect	Valid & reliable; Comparable

BBS = Berg balance scale; CONFBal = confidence in maintaining balance scale; FRT = functional reach test; GDS15 = geriatric depression scale; GHQ30 = 30-item general health questionnaire; IADL = Lawton's incidental activities of daily living; MBI = modified Barthel index; NTS = near tandem stand; SF-36 = short-form health survey (SF-36v2); SF-12 = short-form health survey (SF-12); SFES-I = short falls efficacy scale international; TUGT = timed up and go test.

[a] Cronbach α.
[b] ICC = intraclass correlation coefficient.
[c] r = Pearson correlation coefficient.
[d] r_s = Spearman Correlation Coefficient.
[e] ROC = receiver operating characteristic.
[f] Effect size.
[g] Factorial analysis with Varimax rotation.

the highest level of FOF, as in the Greek version,[24] where the FES-I scores were higher in men than in women. The relationship between the rate of fall and FES-I was demonstrated in five cultures.[9,19,22,23,26] The score of the FES-I enabled discriminate participants in accordance with the level of education, as amended by Iran.[26]

The elderly with multiple falls have increased risk of restriction of activities for fear of falling.[26] There were higher scores on the FES-I in participants with a history of falls.[19,22] In the Brazilian[9] population the total score of the FES-I was an important variable for predicting falls. However, the Turkish version of the FES-I score is not associated with a history of falls.[24]

Convergent validity demonstrated a relationship between the quality of life scale, short-form (SF36 and SF12) and the score of the FES-I, in the Chinese[26] version in both subscales of the SF12, the dimensions physical function and mental health. However, the correlation was higher for physical function, similar to the Swedish[20] version, and physical ($r = -0.59$) and mental ($rs = -0.40$) components.

The FES-I had a high correlation with the subscales of the scale physical (physical function, role physical, and general health) of SF36 in the Greek[23] and Iranian[26] versions. The relationship between the FES-I and timed up and go test (TUGT) was moderate to strong in the Turkish version ($r = 0.74$)[24], Greek ($r = 0.64$),[23] and Iranian ($rs = 0.51$)[26] versions. However, in the Iranian[26] version the ratio was higher in the self-report mode ($rs = 0.55$) than in the interview ($rs = 0.44$). In the study of Turkey[24] it was found that low TUGT was associated with low FES-I scoring.

The convergent validity of the FES-I was confirmed with a series of health measures, psychological and physical performance, in particular dizziness,[8,25] the use of multiple medications,[8,25] functional impairment, use of a walking aid,[24,25] diminished strength,[22] fear of falling as a measure uni-item,[9,19,24,25] symptoms,[22,25] reduced quality of life,[20,22,25,26] committed balance, and a slower TUGT.[8,22–24,26] Regarding discriminant validity, samples from Brazil,[9] Australia,[22] and Turkey[24] were studied, which presents adequate convergent validity.[12]

In the FES-I of Brazil[9] the cutoff point to differentiate between seniors who fell from those that did not fall was the point > 23 (47% sensitivity and 66% specificity) and a score > 31 identified an association with recurrent falls (100% sensitivity and 87% specificity). In Australia[22] cutoffs were defined to differentiate between low and high concern (16–22 and 23–64) and between low, moderate, and high concern (16–19, 20–27, and 28–64). The area under the receiver operating characteristic curve for the 16 FES-I items ranged from 0.58 for balance, to 0.67 for history of fall, and to 0.74 for depressive symptoms, which was similar in the shortened version of the FES-I. In the Turkish[24] version the cutoff was 24 (area under the curve 0.70, sensitivity 70%, and specificity 65%). This presents adequate criterion validity (accuracy between 0.70 and 0.90).[12]

The elderly with a score higher than 24 points should be informed about the precautions to reduce the risk factors for falls, but the restriction of physical and social activities due to fear of falling should be avoided.

The sensitivity or responsiveness to change of FES-I generally increased over time, regardless of any fall event, with a tendency towards a more marked increase when a person has suffered multiple falls over a period of 3 months. Sensitivity to change among those who fell and those who did not fall had a large effect size (0.89), indicating good discriminant validity between groups. However, there is strong evidence about the response to the change in healthy elderly.[24] In Iran the study the lowest possible score (floor effect) was obtained by eight of the 78 (10.3%) elderly in the self-reported group and seven of 113 (6.2%) participants in the interview group, while only one in 113 (0.88%) people in the interview group reported the highest possible score (ceiling effect).[26]

The short version of FES-I showed a high correlation with the FES-I in Italy ($rs = 0.97$ and $rs = 0.98$)[21] and China ($rs = 0.98$).[25]

The FES-I was considered an acceptable and understandable scale to measure the fear of falling in elderly in Germany, The Netherlands and UK,[19] Sweden,[20] Italy,[21] Brazil,[9] Greece,[23] Turkey,[24] China,[25] and Iran.[26] This instrument is valid and reliable[8,9,19–26] in various populations and is comparable across different cultures.[9,19–21,23–26] To be considered a valid and reliable measure, its use has been recommended in cross-cultural research in the context of rehabilitation[19,20,23] in clinical trials[19–21,26] and clinical practice[23] in fall-prevention programs in the elderly.[21]

In future studies, responsiveness of the FES-I should be explored during intervention studies[22,25] and confirm the cutoff points in other contexts, larger samples, and different cultures.[22]

Through the results obtained in this review, it can be concluded that the FES-I is considered understandable to measure the fear of falling in the elderly; it is valid, reliable, and comparable cross-culturally, and it is consistently recommended in several areas, including rehabilitation research, clinical trials, clinical practice, and prevention programs for falls in the elderly.

This study emphasizes the adoption of strategies to promote elderly health, the preventive effect of the fall, with regard to investment in policies that offer appropriate living conditions to the person during the aging process.

The results should be analyzed taking into account the limitations imposed by the inclusion criteria in this review, such as the fact that only studies with full text available were selected, the time frame of publication of results was 10 years and the selected languages may have restricted access to other results of equal relevance.

Conflicts of interest

All authors have no conflicts of interest to declare.

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