The Short FES-I: a shortened version of the falls efficacy scale-international to assess fear of falling

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Abstract

Background the 16-item Falls Efficacy Scale-International (FES-I) has been shown to have excellent reliability and construct validity. However, for practical and clinical purposes, a shortened version of the FES-I would be useful.
Objective to develop and validate a shortened version of FES-I while preserving good psychometric properties.
Design initial development of a shortened version using data from a UK survey (Short FES-I; $n = 704$), test of reliability and validity of the Short FES-I using data from a Dutch survey ($n = 300$).
Setting community samples.
Methods comparison of reliability and validity of the Short FES-I and the FES-I in a random sample of 193 people aged between 70 and 92.
Results the internal and 4-week test–retest reliability of the Short FES-I is excellent (Cronbach's alpha 0.92, intra-class coefficient 0.83) and comparable to the FES-I. The correlation between the Short FES-I and the FES-I is 0.97. Patterns in differences with respect to mean scores according to age, sex, falls history, and overall fear of falling are similar for the Short FES-I and the FES-I. The FES-I had slightly better power to discriminate between groups differentiated by age, sex, falls history, and fear falling, but differences are small.
Conclusions the Short FES-I is a good and feasible measure to assess fear of falling in older persons. However, if researchers or clinicians are particularly interested in the distributions of specific fear of falling-related activities not included in the Short FES-I, the use of the full FES-I is recommended.

Keywords: *fear, accidental falls, quality of life, aged, questionnaires, elderly*

Introduction

Fear of falling is a common problem in older people [1]. In community samples at least 25% of older people report fear of falling, with a higher prevalence among people who have fallen and people living in institutional settings [2–8]. Fear of falling itself may not be a problem as long as it is not excessive and does not interfere with daily functioning. Indeed, it may represent a realistic appraisal of risk. However, when fear of falling results in avoidance of activities [5, 6, 9] and reduction of physical fitness, it is a risk factor for future falls [9] and associated mortality, dysfunctioning, and

premature nursing home admissions [10–13]. Fear of falling and activity avoidance may result in social isolation and inactivity, and threatens the quality of life [5, 14].

Over recent decades, several measures have been developed to assess psychological aspects of falling, including fear of falling [15]. However, as Jørstad and colleagues noted, confusion exists because of the different constructs in this area of research, and it is not always clear exactly what is being measured: fear of falling, fall-related self-efficacy, balance confidence, and activity avoidance [15]. The first and most widely used scale was the 10-item Falls Efficacy Scale

45

(FES) [16]. The original FES version measured fall-related self-efficacy ('how confident are you that you can do . . . without falling'), but later versions referred to fear aspects of falling ('how concerned are you that you might fall if you do . . .') [17]. Although the FES has been shown to be reliable and valid, several commentators have suggested that the FES could be improved as a measure of fear of falling [17]. First, the items of the original FES refer almost exclusively to very basic activities of daily living that only frail or disabled people would be likely to have difficulty with because of their fear of falling. The FES does not include more demanding or complex activities that may be relevant for older people with higher functioning. Second, none of the items of the original FES directly evaluate the impact of fear of falling in social circumstances. To remedy these problems, the 16-item Falls Efficacy Scale-International (FES-I) was recently developed by the Prevention of Falls Network Europe (ProFaNE) group [17–19]. The FES-I has excellent psychometric properties, and these have been demonstrated both in English and in a cross-cultural context [20]. There is a strong interest in FES-I and the English version of the FES-I has already been translated into 14 languages, using a standardised translation protocol [20]. The translated versions are available through the ProFaNE website [19].

However, a shortened version of FES-I is desirable. First, such a measure may be more useful for different purposes. Although clinicians may be interested in the range of concerns measured in a longer version that may be addressed by treatment, researchers may be interested in a briefer instrument especially when it is to be used as part of a battery of scales or for screening purposes. Depending on their objectives, researchers and clinicians can choose the appropriate version. Second, the internal reliability estimates of FES-I are very high [17, 20], suggestive of redundancy. This indicates that the FES-I may be shortened while preserving good psychometric properties. The objectives of the present article are twofold. First, we will develop a shortened version of the FES-I. Second, we will study the psychometric properties of this shortened version and compare its properties with the original 16-item version.

Methods

Participants and design

We used two samples. For the development of the shortened version of the FES-I, we used data from 704 people aged over 60 years in the UK, which were also used for the development of the FES-I [17]. These participants were recruited by a variety of methods to ensure that people of different ages, gender, socio-economic background, levels of physical functioning, and medical history were sampled, with over-sampling of populations at greater risk of falling and fall-related injury. A sample of 589 participants was recruited by means of advertisements placed in magazines and on Internet websites, and through leisure groups, self-help groups, and community organisations. A further 115

people were recruited from sheltered accommodation and lunch clubs for older people [17].

For the assessment of the psychometric properties of the shortened FES-I a random sample of 300 Dutch people aged 70 years or over was taken from the local administration lists in September 2004 in the city of Heerlen [20]. This sample included mostly independent living older people; however, we estimate that approximately 5% of this population lived in homes for the elderly. Data on the FES-I was administered in a first postal survey (T1). After 4 weeks, the FES-I was re-administered in the total sample for test—retest reliability (T2). Approval for this study was obtained from the committee of the Academic Hospital Maastricht, The Netherlands.

Measures

For the development of the shortened FES-I, we collected the UK data by means of a postal survey ($n = 589$) and face-to-face structured interviews ($n = 115$). Alongside the 16 items of the FES-I and several socio-demographics, we assessed falls history in the past year: no falls, one fall, or two or more falls.

For the assessment of the psychometric properties of the shortened FES-I we collected the Dutch data by means of two postal surveys: one at baseline (T1) and one after 4 weeks (T2). In both surveys we assessed the 16 items of the FES-I. At T1, four other variables were included which were found to be associated with fear of falling [3, 5, 20] and can be used to study discriminant validity. In addition to age and sex, all participants were asked two additional questions: 'During the past year, how often have you fallen over?' ('never', 'once', or 'twice or more') and 'In general, are you afraid of falling over?' (i.e. 'fear of falling', with the answer options 'not at all', 'a little', 'quite a bit', and 'very much').

Selection of items

A combination of face validity and psychometric criteria were used to select items for the shortened version in the UK sample. The first criterion was that all the items must discriminate (with a minimum effect size as assessed by partial eta-squared values of at least 0.01) between people reporting no falls, one fall, or more than one fall in the past year. At this stage, the items 'cleaning the house' and 'preparing simple meals' were excluded, because they did not discriminate significantly between people with no falls or one fall [17]. The second criterion was that, in order to be sensitive to the full range of levels of fear, the shortened version of the FES-I must include a balanced range of items assessing activities that provoked very low levels of fear in some people (e.g. getting dressed), activities that provoked medium levels of fear (e.g. going up and down stairs), and activities that provoked very high levels of fear in some people (e.g. walking up or down a slope). We also ensured that, like the FES-I, the shortened version included items assessing social activities outside the home (going out to a social event). Where there was a choice between two items that were equally suitable in other respects, we selected the item that discriminated best

between no falls, one fall, and multiple falls. For example, concern about carrying out social activities could have been assessed by 'visiting a friend or relative' or 'going out to a social event', but the latter item discriminated best between those with no falls and one fall and was therefore selected. Where there was a choice between items meeting all these criteria we chose the item that seemed most unambiguous and widely applicable. For example, 'walking around outside' and 'going up and down stairs' had similar properties in terms of difficulty and discriminatory power, but 'going up and down stairs' was selected because it is a somewhat more precisely defined activity. Finally, we checked that the items selected had satisfactory internal reliability: a set of five items achieved a Cronbach's alpha of 0.89, while a set of seven items had an alpha of 0.92. We decided that the set of seven items was preferable because reliability was likely to be slightly inflated in the sample from which items had been selected, and a longer set of items should be more reliable and sensitive to change over time.

Analysis of reliability and validity

Using the Dutch dataset, reliability statistics for the shortened and the original FES-I were computed: Cronbach's alpha, mean inter-item correlations, means and standard deviations for T1 and T2, and the Spearman correlation and intra-class coefficient (model one-way random) between T1 and T2. Furthermore, we computed the Spearman correlation between the shortened and the original FES-I at T1. Then, to provide tests of construct validity, mean sum scores and standard deviations for the shortened and original FES-I were computed according to age groups (70–79 versus 80+), sex, number of falls in the previous year, and levels of fear of falling. Differences between categories were tested with Mann–Whitney U and Kruskal Wallis tests. Lastly, effect sizes of the sum scores of the shortened and original FES-I were computed for younger (70–79 years) versus older (80+ years) participants, for males versus females, for frequency of reported falls, and the levels of fear of falling by single item. Mean scores of the shortened and original FES-I for the two categories of each of these variables were subtracted and divided by the pooled standard deviation of both categories. The effect size can be used as a measure of discriminant validity [17, 20]. An effect size of 0.20 can be considered as small, 0.50 as medium, and 0.80 as large [21]. All analyses were conducted with SPSS for Windows, version 14.0.

Results

The described combination of face validity and psychometric criteria to select items for the shortened version in the UK sample resulted in a seven-item shortened version of the FES-I: the Short FES-I. The Short FES-I is presented in the Box.

Box. Introduction, items, response options and scoring instructions of the Short FES-I[a]

> Introduction:
>
> Now we would like to ask some questions about how concerned you are about the possibility of falling. Please reply thinking about how you usually do the activity. If you currently do not do the activity, please answer to show whether you think you would be concerned about falling IF you did the activity. For each of the following activities, please tick the box which is closest to your own opinion to show how concerned you are that you might fall if you did this activity.
>
> ---
>
> 1. Getting dressed or undressed
> 2. Taking a bath or shower
> 3. Getting in or out of a chair
> 4. Going up or down stairs
> 5. Reaching for something above your head or on the ground
> 6. Walking up or down a slope
> 7. Going out to a social event (e.g. religious service, family gathering or club meeting)
>
> ---
>
> Answer options:
>
> ☐ 1. Not at all concerned
> ☐ 2. Somewhat concerned
> ☐ 3. Fairly concerned
> ☐ 4. Very concerned
>
> ---
>
> Handling Short FES-I sum scores:
>
> To obtain a total score for the Short FES-I simply add the scores on all the items together, to give a total that will range from 7 (no concern about falling) to 28 (severe concern about falling).
>
> ---
>
> Handling Short FES-I missing data:
>
> If data is missing on more than one item then that questionnaire cannot be used. If data is missing on no more than one of the seven items then calculate the sum score of the six items that have been completed (i.e. add together the responses to each item on the scale), divide by six, and multiply by seven. The new sum score should be rounded up to the nearest whole number to give the score for an individual.

[a] Translations available through www.profane.eu.org. The Short FES-I includes items 2, 4, 6, 7, 9, 15 and 16 of the original FES-I.

Validation of the Short FES-I

Of the 300 people in the Dutch sample, 213 (71%) returned the questionnaire administered by postal survey at T1 and 193 people had complete data at both T1 and T2. The mean age of participants was 76.6 years (SD 5.3) with an age range of 70–92, and 117 (61%) were women. Of the participants, 113 (59%) reported no falls in the previous year, 56 (29%) reported one fall, and 22 (12%) reported two falls or more in the previous year. In addition, 54 persons (28%) were not at all afraid of falling, 84 (44%) were a little afraid, 34 (18%) were quite a bit afraid, and 19 persons (10%) were very much afraid of falling.

Table 1. Mean scores and standard deviations at T1 and T2 and reliability estimates of the Short FES-I as compared to the FES-I

	Short FES-I	FES-I
Mean score (SD) at T1	12.4 (5.2)	28.2 (11.4)
Mean score (SD) at T2	12.2 (5.0)	28.1 (11.1)
Cronbach's alpha at T1	0.92	0.96
Mean inter-item correlation T1	0.63	0.64
Spearman Rho correlation T1-T2	0.87[a]	0.87[a]
Intra-class coefficient T1-T2[b]	0.83[a]	0.82[a]

[a] $P<0.05$.
[b] Model one-way random was used.

Mean scores, standard deviations and reliability estimates for the Short FES-I and the FES-I are presented in Table 1. The internal reliability estimate (Cronbach's alpha) was somewhat lower for the Short FES-I as compared with the FES-I. The mean inter-item correlation at T1 as well as the associations between T1 and T2 are similar for the Short FES-I and the FES-I. The Spearman correlation between the Short FES-I and the FES-I was 0.97 (latter not tabulated).

Mean sum scores and standard deviations of the Short FES-I and the FES-I according to age, sex, falls history, and levels of fear of falling are presented in Table 2. Older people (80+ years) had higher scores than younger people (70−79 years) and females reported higher scores as compared to males. Furthermore, the scores of the Short FES-I were clearly related to the number of falls and the fear of falling single item. Patterns were very similar for the Short FES-I and the FES-I.

In Table 3, effect sizes of the Short FES-I and the FES-I are presented for younger (70−79 years) versus older people (80+ years), for males versus females, frequency of reported falls, and the level of fear of falling. Although effect sizes for the Short FES-I were generally lower as compared to the FES-I, differences were not large, particularly for age, falls history, and the level of fear of falling.

Discussion

In previous studies we concluded that the FES-I has excellent psychometric properties [17], even in a cross-cultural context [19], and that the FES-I may be a better alternative to assess fear of falling than the original FES [16]. This is because more demanding activities outside the home and social activities were included in the FES-I alongside basic activities of daily living. The results of the present study indicate that the shorter version of the FES-I, the Short FES-I, is highly comparable with the 16-item FES-I with respect to internal and test−retest reliability and discriminative power. The internal reliability estimate was somewhat lower for the Short FES-I compared to the FES-I. This is likely due to the smaller number of items, given that the mean inter-item correlations were similar. The Spearman correlation between the Short FES-I and the FES-I was 0.97. In contrast to the FES, both the FES-I and the Short FES-I include

physically more demanding activities outside the home and social activities. Both the Short FES-I and the FES-I showed no ceiling effects, which indicate that both measures may also be appropriate for populations of older persons with substantial levels of fear of falling and those with low levels of fear of falling. We may conclude that the Short FES-I is a good alternative to the FES-I when fear of falling is assessed in community-dwelling older persons.

Table 2. Mean scores (standard deviations) of Short FES-I and FES-I according to age, sex, falls history, and fear of falling

Range	n	Short FES-I 7−28	FES-I 16−64
Age			
70−79	148	11.8 (4.9)[a]	26.7 (10.5)[a]
80+	45	14.4 (5.8)	33.0 (13.1)
Sex			
Male	76	11.4 (4.6)[a]	25.2 (9.7)[a]
Female	117	13.1 (5.5)	30.1 (12.1)
Falls in previous year			
0	113[b]	11.5 (4.9)[c]	26.1 (10.4)[c]
1	56	12.5 (4.7)	28.1 (10.2)
>1	22	16.9 (6.5)	38.5 (14.3)
Fear of falling			
Not at all	54[b]	8.0 (1.4)[c]	18.7 (2.5)[c]
A little	84	11.6 (3.1)	26.1 (6.4)
Quite a bit	34	16.5 (4.1)	36.8 (9.2)
Very much	19	21.8 (4.6)	49.6 (10.5)
Total	193	12.4 (5.2)	28.2 (11.4)

[a] Differences tested for age and sex categories with Mann−Whitney U test, $P<0.05$.
[b] Not all subtotals add to total of 193 owing to two missing values.
[c] Differences tested for falls and fear of falling categories with Kruskal Wallis test, $P<0.05$.

Table 3. Effect sizes for age categories, sex, falls history, and fear of falling for Short FES-I and FES-I[a]

	Short FES-I	FES-I
Age		
70−79 versus 80+	0.51	0.55
Sex		
Male versus female	0.32	0.43
Falls in previous year		
0 versus 1	0.20	0.22
0 versus >1	0.98	1.03
1 versus >1	0.79	0.82
Fear of falling		
Not at all versus a little	1.15	1.16
Not at all versus quite a bit	1.71	1.69
Not at all versus very much	2.09	2.09
A little versus quite a bit	1.21	1.23
A little versus very much	1.95	2.01
Quite a bit versus very much	1.08	1.12

[a] Effect sizes computed as differences in means per categories divided by pooled sample standard deviation for categories. Higher scores indicate better discriminative validity.

The FES-I (and therefore also the seven items of the Short FES-I) has already been translated into Brazilian-Portuguese, Danish, Dutch, Finnish, French, German, Greek, Hindi, Italian, Norwegian, Punjabi, Spanish, Swedish, and Urdu (see [19]. In addition, as for the FES-I, a standardised protocol with respect to the introduction, answer options, and the way missing item scores are handled, is available (see Box). This may facilitate international comparisons of future studies. To further facilitate comparisons, we recommend reporting on both Short FES-I and FES-I outcomes in situations where researchers use the FES-I.

This study has several limitations. First, in the present study we selected the 7 items of the Short FES-I out of the 16 items of the FES-I. The nine remaining items of the FES-I may have influenced the answers regarding the seven items of the Short FES-I. Second, our conclusions are based on observation, comparison, and interpretation of our data and not on inferential statistical testing of the differences between the two versions of the FES-I. Third, we did not analyse sensitivity to change. Future (intervention) studies may observe differences in the sensitivity to change for the different versions of the FES.

In summary, both versions of the FES-I showed excellent psychometric properties. The FES-I gives more information about the range of activities that are feared, is marginally better at discriminating between sub-groups, and might therefore in the future prove slightly more sensitive to change. However, the Short FES-I may be more feasible in settings when less time for assessment is available or respondents are less able to fill in longer questionnaires.

Key points

- The 16-item FES-I was developed to also assess fear concerns about demanding activities outside the home and social activities, using cross-culturally valid items.
- Although the psychometric properties of the FES-I proved to be good, the scale is rather long with very high internal consistency.
- The Short FES-I is a seven-item shortened version of the FES-I and may be useful for practical purposes. Depending on their objectives, researchers and clinicians may choose between the short and the longer versions of the FES-I.
- The psychometric properties and discriminative power of the Short FES-I were nearly as good as the FES-I.

Conflicts of interest

No conflicts of interest.

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