

## ORIGINAL ARTICLES

## Falls and confidence related quality of life outcome measures in an older British cohort

S W Parry, N Steen, S R Galloway, R A Kenny, J Bond

### Abstract

**Falls are common in older subjects and result in loss of confidence and independence. The Falls Efficacy Scale (FES) and the Activities-specific Balance Confidence scale (ABC) were developed in North America to quantify these entities, but contain idiom unfamiliar to an older British population. Neither has been validated in the UK. The FES and the ABC were modified for use within British culture and the internal consistency and test-retest reliability of the modified scales (FES-UK and ABC-UK) assessed. A total of 193 consecutive, ambulant, new, and return patients (n=119; 62%) and their friends and relatives (“visitors”, n=74; 38%) were tested on both scales, while the last 60 subjects were retested within one week. Internal reliability was excellent for both scales (Cronbach’s alpha 0.97 (FES-UK), and 0.98 (ABC-UK)). Test-retest reliability was good for both scales, though superior for the ABC-UK (intraclass correlation coefficient 0.58 (FES-UK), 0.89 (ABC-UK)). There was evidence to suggest that the ABC-UK was better than the FES-UK at distinguishing between older patients and younger patients ( $|t_{ABC}| = 4.4$ ;  $|t_{FES}| = 2.3$ ); and between fallers and non-fallers ( $|t_{ABC}| = 8.7$ ;  $|t_{FES}| = 5.0$ ) where the  $t$  statistics are based on the comparison of two independent samples. The ABC-UK and FES-UK are both reliable and valid measures for the assessment of falls and balance related confidence in older adults. However, better test-retest reliability and more robust differentiation of subgroups in whom falls related quality of life would be expected to be different make the ABC-UK the current instrument of choice in assessing this entity in older British subjects.**

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Falls are common, disabling, and frequently fatal events affecting between 30% and 50% of older individuals annually.<sup>1–5</sup> The uniformity of these prevalence data is striking and suggests an enormous personal and public health burden. Indeed, unintentional injury, usually from falling, ranks as the sixth most common cause of death in the over 65 years age group in

the US,<sup>6,7</sup> while 10%–15% of falls result in serious injuries, of which up to 50% are fractures.<sup>2,3,8</sup> Within the UK, 39%–44% of adult patients attending inner city accident and emergency (A&E) departments present with falls,<sup>1,2</sup> while 34% of admissions from A&E are a direct result of falling.<sup>2,6,9</sup> The lifetime cost of falls in patients over the age of 65 years in the US was thought to exceed \$12.6 billion almost a decade ago,<sup>10</sup> while in the UK, the treatment of accidental injuries (of which falls are the major cause of hospitalisation and death in older patients<sup>11</sup>) costs £1.2 billion annually.<sup>12</sup> The government has recently recognised the enormity of the problem through its consultative green paper,<sup>13</sup> which aims for a reduction in accidents of one fifth by 2010, while identifying older people as one of the major target groups for implementation of the green paper’s recommendations.<sup>13</sup>

While the physical and socioeconomic consequences of falls are relatively easily measured, the ensuing psychological morbidity and effects on confidence and independence are more insidious and less easily quantifiable. The terms “post-fall syndrome”<sup>13</sup> or “fear of falling”<sup>5,10,14–16</sup> have been used to describe a loss of confidence and voluntary restriction on activity after a fall that is dramatically out of proportion to the physical injuries sustained.<sup>5,14–16</sup> An assessment of such parameters, which often affect patients’ quality of life more profoundly than the index fall, is important both to clinical practice and in the evaluation of therapies aimed at reducing the incidence of falls and ameliorating their consequences. Attempts to quantify this entity have been developed in North America, namely the Falls Efficacy Scale (FES)<sup>17</sup> and the Activities-specific Balance Confidence scale (ABC),<sup>18</sup> but neither scale has been validated in a British population. Both scales were developed using local patterns of English language usage, and contain American-English idiom unfamiliar to the questionnaire’s target population in the UK. These language difficulties became apparent while using the scales at our specialist falls and syncope facility in the assessment of falls intervention strategies, making self completion of the scale difficult for many older patients. There are a number of dangers in modifying an existing measure for use in a different culture.<sup>19</sup> Ideally the measure should be developed simultaneously in different cultures and each of the following should be assessed: appropriateness, acceptability, reliability (internal consist-

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Table 1 Clinical characteristics of validation study subjects

	Subjects (n=193)
Mean (SD) age in years	63 (14.8)
Patients (n=119)	68 (13.5)
Visitors (n=74)	56 (14.2)
Sex (%)	
Female	128 (66)
Male	65 (34)
Fallers (%)	95 (49)
Fallers with fractures after fall	14 (14% of 95)

ency, test-retest), validity, responsiveness, precision, interpretability, and feasibility.<sup>20</sup> Recognising these difficulties but in the face of the need for more robust and pertinent outcome measures in this area, and the need for a relevant, easily administered and understood tool for the assessment of individual patients suffering from falls, we decided to modify the FES and ABC into forms familiar to our patient group and then to investigate their scale properties in an older British cohort.

The objectives were:

- To modify the FES and ABC without changing their inherent structure and psychological constructs for use within the UK.
- To assess the acceptability, internal consistency, and test-retest reliability of the modified FES (FES-UK) and ABC (ABC-UK).
- To examine the relative performance of the two scales in relation to subjects' ages, and falls and injury history.

## Subjects and methods

### SUBJECTS

Two hundred and two subjects were approached of whom 193 agreed to participate in the study. Participants were consecutive, ambulant, new, and return patients (n=119; 62%) and their friends and relatives ("visitors", n=74; 38%) attending the falls and syncope facility who were literate, sighted, and able to self complete the questionnaires. Nine subjects refused to participate. Clinical characteristics of the validation study participants are provided in table 1.

### PILOT STUDY: MODIFICATION OF THE ABC

A panel comprising the investigators and health services researchers with specialist interests in cross cultural health status measurement "translated" the unfamiliar words and phrases (for example, "sidewalk" into "pavement", "mall" into "shopping centre", "closet" into "cupboard") and the resulting modified ABC was piloted on 30 consecutive patients attending the falls and syncope facility to ensure face

validity, relevance, and ease of comprehension. The ABC-UK is a 16 item scale which asks subjects to rate confidence regarding their balance and ability to remain steady when performing various tasks, from 0% (no confidence) to 100% (completely confident) in multiples of 10%. The items (as in the original ABC) are graded in difficulty from the easiest (question 1) to the most difficult (question 16) in terms of balance confidence. No further modification was required after the pilot study.

### THE FES

An Anglicised version of the FES in which "cabinets or closets" was changed to "cupboards" has been used at our facility for several years and has been used as an outcome measure in several ongoing falls related research projects involving over 200 subjects. Its face validity, acceptability, and relevance to individuals with falls is thus established. The FES also asks individuals to rate confidence in performing daily activities by circling numbers from 1 (extremely confident) to 10 (no confidence at all) for 10 questions.

Full text of the FES-UK and ABC-UK are provided in tables 2 and 3.

### RELIABILITY STUDY: ABC-UK AND FES-UK

The two questionnaires were administered in random order (established by table of random numbers) to 193 subjects for self completion. The last 60 participants were sent a second questionnaire pack and stamped self addressed envelope by second class mail with a request for completion and return within one week. The order of presentation for the second questionnaire pack was reversed.

### STATISTICAL ANALYSIS

Internal consistency, a measure of how well the different items making up the scales measure the same construct, was assessed by Cronbach's alpha. Test-retest reliability, a measure of the extent to which a set of results is reproducible, was assessed via the administration of both scales to the same subjects on two separate occasions (initial and a minimum of two days later through second class postage). The intraclass correlation coefficient determined from a two way analysis of variance, in which variation between subjects and between occasions are treated as random effects, was then used to compare responses between initial and repeat tests. The relative performance of the two scales in subgroups likely to differ in terms of falls related quality of life (that is,

Table 2 The modified Falls Efficacy Scale (FES-UK). Please answer these questions by circling the number that you feel is most appropriate yourself. The responses are graded from 1 to 10, with 1 meaning that you feel extremely confident and 10 meaning that you have no confidence at all

How confident are you that you can...	Circle best answer									
...take a bath or shower?	1	2	3	4	5	6	7	8	9	10
...reach into a cupboard?	1	2	3	4	5	6	7	8	9	10
...prepare a hot meal (not needing to carry heavy or hot objects)?	1	2	3	4	5	6	7	8	9	10
...walk around the house?	1	2	3	4	5	6	7	8	9	10
...get into or out of bed?	1	2	3	4	5	6	7	8	9	10
...answer the door or telephone?	1	2	3	4	5	6	7	8	9	10
...get in and out of a chair?	1	2	3	4	5	6	7	8	9	10
...get dressed or undressed?	1	2	3	4	5	6	7	8	9	10
...do light housework?	1	2	3	4	5	6	7	8	9	10
...do simple shopping?	1	2	3	4	5	6	7	8	9	10

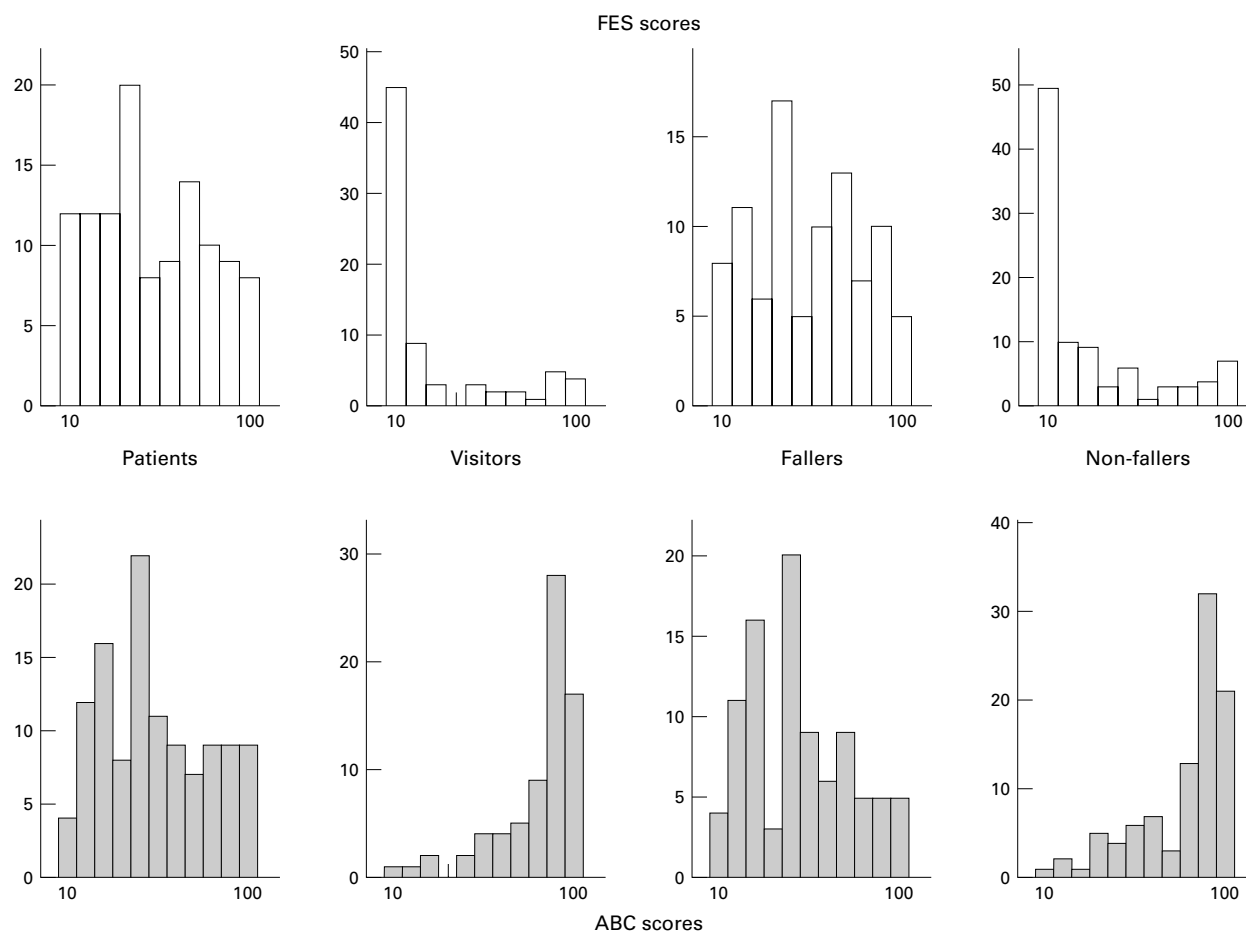


Figure 1 Distribution of FES-UK and ABC-UK scores.

between subjects aged  $\leq 60$  years  $v$   $>60$  years, those reporting falls (fallers)  $v$  non-fallers, and those reporting fractures  $v$  those without) was assessed by examining the results of independent sample  $t$  tests for equality of means.

**Results**

Eighty six per cent of ABC-UK and 94% of FES-UK questionnaires were completed in full. Generally the level of missing data was very small. It was possible to calculate a total FES score for 188 (97.4%) subjects and a total ABC score for 189 (97.9%) subjects. (Both FES and ABC scores were available for 184 (95.3%) subjects.) Thirty nine (65%) of the 60

mailed, repeat questionnaires were returned in total, all being received within one week.

The distribution of scores for various respondents is shown in fig 1. The scores are well distributed across both the FES-UK and ABC-UK for patients, but for visitors were highly skewed; most visitors had high levels of confidence and scored close to the best possible scores of 10 on the FES-UK and 100% on the ABC-UK scale. As most of the patients were fallers the distributions of scores for patients and fallers were almost the same. Similarly the distributions or scores for non-fallers were almost identical to those for visitors.

Table 3 The modified Activities-specific Balance Confidence scale (ABC-UK). For each of the following activities, please indicate your level of self confidence by choosing a corresponding number from the rating scale 0% to 100%, with 0% meaning you have no confidence and 100% meaning you feel completely confident

How confident are you that you can maintain your balance and remain steady when you....	%
1 . . . . .walk around the house?	—%
2 . . . . .walk up or down stairs?	—%
3 . . . . .bend over and pick up a slipper from the floor at the front of a cupboard?	—%
4 . . . . .reach for a small tin of food from a shelf at eye level?	—%
5 . . . . .stand on your tip toes and reach for something above your head?	—%
6 . . . . .stand on a chair and reach for something?	—%
7 . . . . .sweep the floor?	—%
8 . . . . .walk outside the house to a parked car?	—%
9 . . . . .get into or out of a car?	—%
10 . . . . .walk across a car park to the shops?	—%
11 . . . . .walk up or down a ramp?	—%
12 . . . . .walk in a crowded shopping centre where people walk past you quickly?	—%
13 . . . . .are bumped into by people as you walk through the shopping centre?	—%
14 . . . . .step onto or off an escalator while holding onto the handrail?	—%
15 . . . . .step onto or off an escalator while holding onto parcels such that you cannot hold onto the handrail?	—%
16 . . . . .walk outside on slippery pavements?	—%

Table 4 Internal consistency of the ABC-UK and FES-UK

Group	Cronbach's alpha	
	FES-UK	ABC-UK
Patients	0.96 (n=114)	0.98 (n=116)
Visitors	0.99 (n=74)	0.98 (n=73)
All	0.97 (n=188)	0.98 (n=189)

Internal reliability as assessed by Cronbach's alpha was high for the entire sample and within patient and visitor subgroups (table 4). Test-retest reliability (measured by the intraclass correlation coefficient) was 0.89 for the ABC-UK and 0.58 for the FES-UK.

Results of the independent sample *t* tests are given in table 5. Both questionnaires were able to detect differences in falls related quality of life between fallers and non-fallers; and between subjects over 60 and subjects aged 60 or less. In each case the magnitude of the *t* statistic was much greater for the comparison based on the ABC questionnaire was much greater than for the comparison based on the FES questionnaire. Comparing the confidence intervals for the difference in mean scores between groups of patients, differences appear to be more marked on the ABC-UK scale than on the FES-UK scale.

These results indicate that the ABC-UK is better able to discriminate between these subject groups than the FES-UK.

### Discussion

We have assessed the modified versions of both the FES and ABC for use in the UK in terms of acceptability, reliability (both internal consistency and test-retest), validity, and feasibility. In this large sample of attendees at a specialist falls and syncope facility and their carers, friends and relatives, the modified versions of both the FES and ABC demonstrated high levels of internal consistency and test-retest reliability. The ABC-UK scored more highly on test-retest reliability (intraclass correlation coefficient 0.89 *v* 0.58 for the FES-UK). Self completion was easily accomplished for both scales. Significant responder bias was unlikely as only nine (5%) subjects originally approached for the study refused to participate. The original FES and ABC validation studies reported a much lower inclusion rate (54%<sup>17</sup> and 59%<sup>18</sup> respectively) and smaller sample size (56<sup>17</sup> and 60<sup>18</sup> older subjects respectively). The heterogeneity of our participants avoids

the problems of testing discrete, selected populations and adds weight to the generalisability of the scales, although some groups, for example severely cognitively impaired subjects, may be less likely to be referred for a specialist opinion.

Both instruments were able to detect differences (in falls related quality of life) between fallers and non-fallers. These differences were in the direction hypothesised; fallers had a poorer quality of life than the non-fallers. The magnitude of the *t* statistic among fallers was larger for the ABC-UK (-8.5) than the FES-UK (4.8). (The *t* statistics in table 5 have opposite signs because a high score on the ABC-UK and a low score on the FES-UK represent good quality of life.) Similarly for the other two comparisons (subjects with fracture against those without and patients aged >60 years against those aged ≤60 years) the *t* statistics corresponding to the ABC-UK scale were larger than those corresponding to the FES-UK. The confidence intervals for the difference in mean scores given in table 5 also suggest that differences between the subject groups are more marked on the ABC-UK scale than the FES-UK scale. This would tend to suggest that the ABC-UK is better able to detect expected differences in quality of life than the FES-UK.

The utility of the scales in both clinical and research arenas will be influenced by their ability to measure changes in falls related quality of life, with future interventions potentially being targeted at the population from which this sample is drawn. If subjects have the best possible score before the intervention, it will not be possible to determine whether there has been any improvement in falls related confidence due to the intervention, a phenomenon referred to as a "ceiling effect". Less than 10% of patients had the best possible scores of 10 on the FES and 100 on the ABC scale indicating that any ceiling effects in such a study are likely to be small (fig 1). Similarly we may wish to follow a group of subjects over time in anticipation of a deterioration in falls related confidence. If too many subjects have the worst possible score, it would not be possible to observe such deterioration. The distributions of scores for our patient group suggest that there are not likely to be significant "floor effects" when the scales are used with this population.

The reasons for the ABC-UK's superior performance overall are manifold. Certainly, the ABC's underlying psychometric and theoretic

Table 5 Discriminatory power of FES-UK and ABC-UK questionnaires

Comparison (total n=184)†	Independent sample <i>t</i> test*					
	FES-UK questionnaire			ABC-UK questionnaire		
	95% CI for difference in mean score	<i>t</i> Statistic	<i>p</i> Value	95% CI for difference in mean score	<i>t</i> Statistic	<i>p</i> Value
Fallers (92) <i>v</i> non-fallers (91)‡	12.5 to 28.6	5.0	<0.0001	-40.0 to -25.1	-8.7	<0.0001
Previous fractures (13) <i>v</i> none (133)§	-15.6 to 17.1	-0.1	0.93	-30.9 to 3.8	-1.5	0.13
Age >60 years (111) <i>v</i> age ≤60 years (73)	-18.7 to -1.5	-2.3	0.02	10.7 to 27.8	4.4	<0.0001

\*As the FES and ABC are scored in opposite directions, the *t* statistics are expected to have opposite signs.

†That is subjects in whom both ABC-UK and FES-UK were completed.

‡One subject could not be classified.

§Forty one subjects not classified. CI = confidence interval.



cal tenets more accurately reflect the concept of self efficacy, which has been described as the cognitive mechanism by which the ability to control situations reduces stress.<sup>21</sup> The experience of falling results in a perceived lack of control and subsequent fear of falling which is explored in a more contextually relevant and thorough manner by the ABC (and ABC-UK).<sup>16</sup> Where the FES asks about household activities almost exclusively,<sup>17</sup> the ABC considers a range of additional outdoor activities, for example using escalators with and without packages, walking on slippery surfaces, and getting into and out of cars.<sup>18</sup> Such activities emphasise the notion of control over potentially aversive situations, and hence explore the self efficacy concept more accurately. The FES also has limitations in the way in which it is scored, a fact that has been recognised by its authors, who modified the original scale<sup>17</sup> to a four category scoring system changing the words “how confident” to “how concerned” for inclusion in the outcome measures used in the FICSIT falls intervention studies.<sup>22</sup> Of interest, the authors neither reference nor document validation of this modified FES.<sup>22</sup> Both scales may have a further advantage in the use of British English rather than American English, though a comparison between the two versions of the scales was not attempted.

Outcome measures in clinical trials need to be easily administered, relevant, comprehensive, and comprehensible to the patient population examined. The use of improperly modified and inadequately validated questionnaires and scales is to be deplored. The FICSIT studies mentioned above provide one example,<sup>22</sup> but the frequent use of the short form-36 (SF-36)<sup>23</sup> as a generic quality of life measure in elderly subjects provides a further example. Questions in several of the SF-36 subscales can be inappropriate for older hospitalised subjects<sup>24</sup> and those with comorbid conditions<sup>24</sup> and result in poor completion rates and unreliable data.<sup>24 25</sup> Condition specific quality of life measures would appear to be vital instruments for use alongside generic measures since the outcomes important to individual patients may be inadequately examined by generic instruments alone. The falls literature offers several examples of randomised controlled trials where the number of falls and injuries and other physical descriptors are the main outcome measures,<sup>26-31</sup> with confidence and fear of falling playing a minor part in assessment. Falls and injuries may paradoxically indicate an increase in activity and independence, as suggested by a trial of exercise intervention in fallers where the number of falls increased in the intervention group.<sup>32</sup> Improvements in confidence and erosion of fear of falling in such trials will not be measured using physical endpoints alone, and a recent review of the subject strongly recommends that “the perspectives of older people” should be considered during the “planning, evaluation and implementation of interventions” directed at falls.<sup>33</sup>

The ABC-UK and the FES-UK are thus reliable and valid measures for the assessment of falls and balance related confidence and self

### Learning points

- Condition specific instruments are important components of comprehensive quality of life measures.
- Scales developed in other cultures, despite superficial acceptability, may be difficult to use out of context and should be modified appropriately.
- Modified scales should be validated before their widespread use.
- Falls are common in older subjects and frequently result in loss of confidence and self efficacy, the “cognitive mechanism by which the ability to control situations reduces stress”.
- There are no previous UK centred scales to quantify falls related quality of life, though North American scales exist. We “translated” these scales into British idiom (FES-UK and ABC-UK) and tested their psychometric properties in a UK setting.
- Both modified scales were found to be reliable, valid, acceptable measures of falls related confidence and self efficacy in older British subjects.

efficacy in older fallers. Both are easily administered and relevant to their target population, but the translation to British English idiom, more robust differentiation of older from younger subjects, fallers and injured fallers from non-fallers, and better test-retest reliability for the present make the ABC-UK the instrument of choice in assessing falls related confidence in older British subjects. Further assessment of ABC-UK is necessary to examine further its appropriateness in other populations; acceptability to respondents using “cognitive interviewing”<sup>33,34</sup>; responsiveness to change after an appropriate intervention; precision in relation to ceiling and floor affects; and the calibration of scale scores to improve interpretability. There is still a need, however, for the development of a condition specific quality of life measure for older people with syncope and falls that is person centred.

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Subjects were seen at the Cardiovascular Investigation Unit (a dedicated falls and syncope facility for older patients) at the Royal Victoria Infirmary, Newcastle.

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