Disability and Rehabilitation

ISSN: 0963-8288 (Print) 1464-5165 (Online) Journal homepage: https://www.tandfonline.com/loi/idre20

Cross-cultural adaptation and psychometric properties of the Fear of Falling Avoidance Behavior Questionnaire in Turkish community-dwelling older adults

Sevim Acaröz Candan, Arzu Demircioğlu & Ülkü Kezban Şahin

To cite this article: Sevim Acaröz Candan, Arzu Demircioğlu & Ülkü Kezban Şahin (2020): Cross-cultural adaptation and psychometric properties of the Fear of Falling Avoidance Behavior Questionnaire in Turkish community-dwelling older adults, Disability and Rehabilitation, DOI: 10.1080/09638288.2020.1734674

To link to this article: https://doi.org/10.1080/09638288.2020.1734674

Published online: 05 Mar 2020.

DISABILITY AND REHABILITATION
https://doi.org/10.1080/09638288.2020.1734674

Taylor & Francis
Taylor & Francis Group

ORIGINAL ARTICLE

Cross-cultural adaptation and psychometric properties of the Fear of Falling Avoidance Behavior Questionnaire in Turkish community-dwelling older adults

Sevim Acaröz Candan[a], Arzu Demircioğlu[b] and Ülkü Kezban Şahin[c]

[a]Department of Physiotherapy and Rehabilitation, Faculty of Health Sciences, Ordu University, Ordu, Turkey; [b]Department of Physiotherapy and Rehabilitation, Faculty of Health Sciences, Hacettepe University, Ankara, Turkey; [c]Department of Therapy and Rehabilitation, Vocational School of Health Services, Giresun University, Giresun, Turkey

ABSTRACT

Purpose: This study aimed to translate and adapt the Fear of Falling Avoidance Behavior Questionnaire (FFABQ) for Turkish culture and to evaluate the psychometric properties of FFABQ-Turkish in community-dwelling older adults.

Methods: Eighty community-dwelling older adults (41 females) were assessed using the FFABQ-Turkish, Activities-specific Balance Confidence Scale (ABC). Fall history and severity of fear of falling (FoF) were recorded. Forty-two participants were reassessed one week apart for test–retest reliability. Internal consistency, test–retest reliability, sensitivity to change, convergent validity, construct validity, floor and ceiling effect, and scale discrimination of FFABQ-Turkish were investigated.

Results: FFABQ-Turkish has high internal consistency and good test–retest reliability. Overall scores for FFABQ-Turkish were high in females, older individuals $\geq$ 75 years, and fallers. Minimal detectable change with 95% confidence was 4.51 points. There were strong and moderate correlations between FFABQ-Turkish and ABC, FoF, and the number of falls. Factor analysis demonstrated a two-factor structure. No floor and ceiling effect was found. FFABQ-Turkish could discriminate individuals without avoidance behavior from those with severe avoidance behavior.

Conclusions: FFABQ-Turkish is a valid and reliable measure to assess the activity and participation restriction due to FoF, and could be used to quantify avoidance behavior in Turkish community-dwelling older adults.

➤ IMPLICATION FOR REHABILITATION

- The Turkish version of the Fear of Falling Avoidance Behavior Questionnaire (FFABQ) is a valid and reliable outcome measure for community-dwelling older adults.
- Fear of Falling Avoidance Behavior Questionnaire in Turkish is recommended for assessment of activity limitation and participation restrictions due to fear of falling in clinical and research settings.

ARTICLE HISTORY
Received 16 September 2019
Revised 21 February 2020
Accepted 21 February 2020

KEYWORDS
Fear of falling avoidance behavior; activity limitation; participation; outcome measures; psychometric properties; Turkish

Introduction

A fall is defined as an event which occurs suddenly and results in a person coming to rest unintentionally on the ground or other lower level, excluding intentional change in position to rest and the result of a major intrinsic event (e.g., stroke) or overwhelming hazard [1]. Falls are one of the most critical public health problems causing morbidity and mortality in older adults [2]. Approximately, 28–35% of community-dwelling individuals older than 65 years fall at least once a year [3]. The rate of falls in older adults increases with aging. It was shown that 26.7% of older adults aged 65–74 years, 29.8% of older adults aged 75–84, and 36.5% of older adults aged $\geq$85 had fallen at least once in the previous year [4]. A fall can result in fractures, bruising, lacerations, and increased risk of hospitalization and institutionalization, which causes an increase in health care costs [5,6]. Falls threaten the independence of older people and the quality of life in this population [7]. Moreover, falls are also known to lead psychological outcomes, such as fear of falling (FoF) and lower balance confidence in older adults. Both mentioned outcomes have used the concept of "self-efficacy," which refers to an individual's perceived capability within a specific domain of activities [8]. Tinetti and Powell defined FoF as an ongoing concern about falling [9]. In contrast, balance confidence is described as an individual's confidence in the ability to achieve specific daily activities without losing balance [10]. The prevalence of FoF in community-dwelling older adults, which is independent of the fall history, ranges from 20.8% to 85% due to the differences among individuals in terms of age, gender, performed activity (e.g., the FoF ratio was highest during reaching for something over the participant's head) [11]. It is also known that older individuals who have fallen have lower balance confidence and more FoF than non-fallers [12]. As a protective strategy, older adults may decrease their activity level due to FoF, and the rate of this avoidance behavior ranges between 15% and 55% [1,13,14]. Also, even 20% of the older adults who do not experience a fall restrict their activities and reduce their social participation [14]. The occurrence of FoF-associated avoidance behavior may cause some adverse consequences, such as functional decline, restriction of social participation, decreased quality of life, increased risk of falling, and institutionalization

CONTACT Sevim Acaröz Candan fzt_acaroz@hotmail.com Department of Physiotherapy and Rehabilitation, Faculty of Health Sciences, Ordu University, Ordu, 52100, Turkey

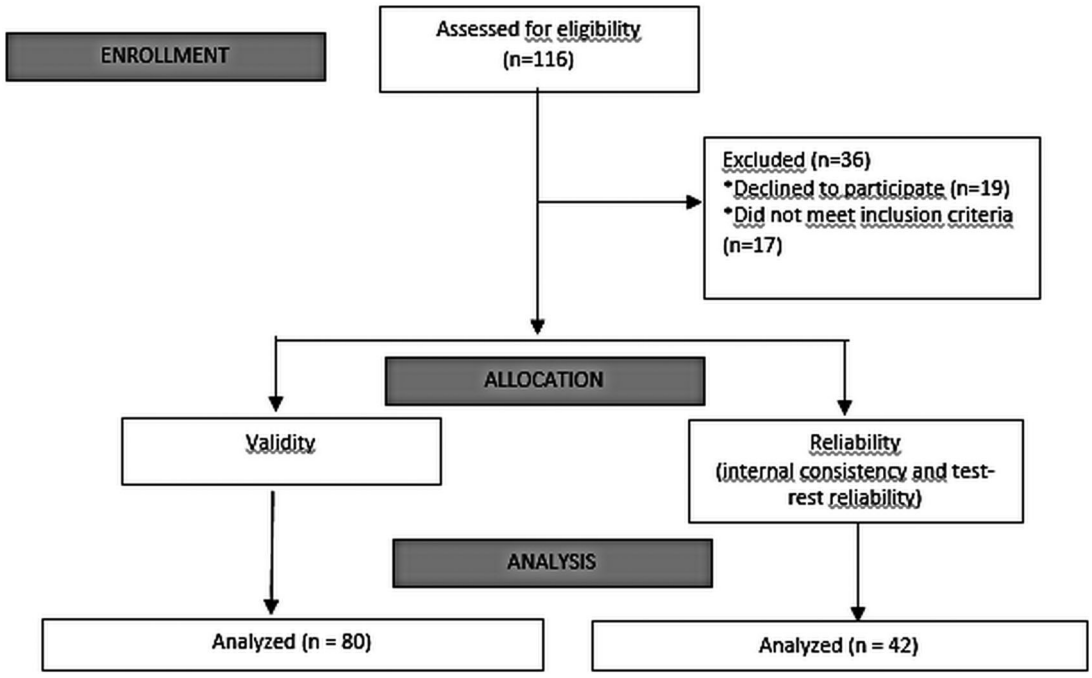

Figure 1. Flow diagram for the participants.

[15–17]. Landers et al. [18] also emphasized that balance confidence and FoF-associated avoidance behavior are the most significant predictors of falling in older adults. Therefore, avoidance behavior needs to be addressed in terms of its effects on activity and participation, which are the main components of the International Classification of Functioning, Disability, and Health (ICF), and its predictive role for future falls [19].

The Fear of Falling Avoidance Behavior Questionnaire (FFABQ) was developed by Landers et al. to assess avoidance behavior (activity limitation and participation restriction) due to FoF in community-dwelling older adults in 2011 [20]. The FFABQ consists of 14 items ranked using the five-point Likert-style, resulting in a maximum possible score of 56 points. A high score indicates activity limitation and participation restriction as a result of FoF [20]. The FFABQ offers a complementary assessment for other balance assessment tools to reveal the impact of balance impairment and falling on a patient's life based on the domains of the ICF model of activity limitation and participation restriction. The FFABQ is recommended for use in older adults because it has excellent psychometric properties, including construct validity, internal consistency, and test–retest reliability, and is practical to use [20]. The translation and cultural adaptation of such valid, reliable questionnaires into different languages contribute to the development of universal conceptual unity and measurement tool between cultures and languages, particularly with intended to the characteristic it measures. For this reason, questionnaires are translated into many languages and adapted to different cultures, but there is no version of FFABQ translated into any language (except the original English version). When we reviewed the literature to find an assessment tool in Turkish about FoF-associated avoidance behavior, we realized that there are scales in Turkish related to balance disorders, balance-confidence, and FoF [10,21,22]. However, we could not find a valid and reliable assessment tool in Turkish about avoidance behavior due to FoF. Therefore, our study aimed to translate and culturally adapt the FFABQ into Turkish and investigate the psychometric properties of the FFABQ-Turkish version (FFABQ-T). Thus, our Turkish version will be the first translated version from the original FFABQ.

Methods

The development and psychometric study of the FFABQ-T was performed after approval from Merill Landers, the developer of the original questionnaire [20]. This study was approved by the Ethics Committee for Clinical Investigations of Ordu University and was conducted in compliance with the Declaration of Helsinki for medical research involving human subjects. All participants gave their written informed consent prior to the commencement of the study. This trial was registered with ClinicalTrials.gov, number NCT03413787.

Participants and study procedure

Community-dwelling older adults: (i) aged 65 or above, (ii) with a score of 21 or more from the Mini-Mental State Examination (MMSE) [20,23], (iii) who are ambulatory independently or with an assistive devices, and (iv) who live in three urban regions of Ordu (for these regions, permission was granted by the district governorship for study recruitment) were included in the study. Participants were excluded if they had any serious neurological, cardiopulmonary, or orthopedic disorders that adversely affected balance conditions. The other exclusion criteria are inability to communicate in Turkish, having visual and hearing problems that may cause difficulties in communication and also balance impairments, and drug use (benzodiazepine, psychotropic drugs, etc.) with adverse effects on balance and walking. Additionally, if the health status of the participants had changed within the test–retest period (in a week), these participants would be excluded, but there were no older adults in this study whose health status changed. A total of 116 older adults were assessed for eligibility. Nineteen subjects declined to participate, and 17 subjects were excluded, four of which used drugs with adverse effects on balance and walking, five had visual and hearing difficulties, six had MMSE score < 21, and two were bedridden. A total of 80 subjects participated in this study and were evaluated for the validity of the FFABQ-T. The reliability of the FFABQ-T was tested on 42 participants with one-week interval after the first administration (Figure 1). In the second assessment, only the FFABQ-T was performed.

Translation and cultural adaptation

The translation and cultural adaptation of the questionnaire was conducted according to the rules of Beaton et al. [24]. The standard "forward-backward" procedure was applied to translate the questionnaire from English into Turkish. Three independent bilingual translators who are native Turkish speakers (two of them were physiotherapists and aware of the study, the other one was a lecturer from the Department of English Language & Literature) translated the items into Turkish following cultural adaptation. The three translated versions were compared, and the translators combined them into one translated version. Subsequently, the preliminary version was back-translated into English by a native English speaker with fluent Turkish language. The back-translated version was compared to the original English version to check whether there was a similar structure. Then, the translators and a researcher agreed on the prefinal Turkish version of the FFABQ. The prefinal version was tested on 10 volunteer older adults. After the pilot administration, since no changes were required, the prefinal version of the FFABQ-T was approved as the final version (Appendix).

Data collection procedures

A physiotherapist evaluated all participants through a structured face to face interview. Sociodemographic information (age, gender, education status, civil status, and living arrangements), the status of assistive device usage, and fall history over the past 12 months were recorded. History of fallings was determined with the question: "How many times have you fallen in the past year?". According to the participants' answers, the researchers categorized the participants into two groups: fallers (one or more fall events) and non-fallers (no falls). The participants were also asked to grade their overall FoF by answering a question "How concerned are you about falling?" on a numerical rating scale range from 0 (not concerned) to 10 (very concerned). The avoidance of some activities or participation restriction due to FoF was assessed using FFABQ-T, which is a self-report measure and contains 14 items with five-point Likert-type scoring. The modified scoring (which score the frequency of occurrence) was used in this study because it was easy to understand for Turkish older adults and more practical to grade than the original scoring. The original scoring involved "Completely disagree," "Disagree," "Unsure," "Agree," and "Completely agree" rating system, whereas in the modified version, "Never," "Rarely," "Sometimes," "Often," and "Always" were scored as 0, 1, 2, 3, and 4 points, respectively. The score that can be obtained from the questionnaire is between 0 and 56. Higher scores indicate that the individual is more likely to restrict their activities due to FoF [20]. Balance confidence was evaluated by the Activities-specific Balance Confidence Scale (ABC). This scale consists of 16 task-specific questions regarding balance confidence according to functional status. The total score ranges from 0% (no confidence) to 100% (full confidence), and the total high score indicates increased confidence. ABC is a useful scale that can be used in the assessment and treatment of balance confidence status and fall risk of older adults [10].

Statistical analysis

All statistical analyses were performed using SPSS for Windows, version 20.0 (SPSS Inc, Chicago, IL). Descriptive characteristics are presented as mean (SD) or percentage. Normal distribution was tested using the Shapiro–Wilk test, and nonparametric tests were used due to non-normal distribution of data. Nonparametric data were expressed as median (interquartile range 25th–75th percentiles). Mann–Whitney's *U*-test and Kruskal–Wallis's test were used to determine the differences between the groups with respect to FFABQ-T scores for known-group validity. Reliability was assessed through internal consistency and test–retest methods. For internal consistency, Cronbach's alpha value was calculated, and the values of $\geq$0.7 were acceptable, preferably $\geq$0.8 [25]. Test–retest reliability was evaluated with a seven-day interval between two administrations of the scale using the intraclass correlation coefficient (ICC) (a two-factor, mixed-effects model and type absolute agreement was chosen). An ICC of at least 0.75, between 0.75 and 0.40, and less than 0.40 was considered good, moderate, and low test–retest reliability, respectively [26]. The sensitivity of the scale was calculated by minimal detectable change with 95% confidence (MDC_{95}) based on the standard error of measurement (SEM) using the test–retest reliability statistic with the following formulae [27]:

$$\text{SEM} = \text{standard deviation} \times \sqrt{(1-\text{ICC})} \text{ and MDC95}$$
$$= \text{SEM} \times \sqrt{2} \times 1.96$$

The correlation of the FFABQ-T scores with ABC scores, FoF severity, and falling number was calculated using Spearman's correlation coefficient for convergent validity. The strength of the correlations was classified as follows: $\geq$0.60 "strong", between 0.30 and 0.70 "moderate", and $\leq$0.30 "weak" [28]. Exploratory factor analysis was used to evaluate the structure of the FFABQ-T. Before factor analysis, the Kaiser–Meyer–Olkin measure of sampling adequacy and Bartlett's test of sphericity were performed to determine whether the data and sample were suitable for factor analysis. Exploratory factor analysis using principal component analysis with oblimin rotation was performed if Kaiser–Meyer–Olkin value was >0.5, and Bartlett's test result was significant. Oblimin rotation is an appropriate rotation method for examined factors that are prone to be in a relationship (generally scales in social and health sciences fit this situation). The factors were extracted based on eigenvalues greater than one and were also confirmed using scree plots. If the factor loading of any item was lower 0.40, it was omitted from the questionnaire [29]. Floor and ceiling effect was determined by calculating the percentage of the numbers of patients with minimum or maximum possible scores. If this amount is greater than 15%, we considered that the floor and ceiling effect was present [30]. The scale discrimination was tested using Mann–Whitney's *U*-test to determine whether there was a significant difference between scale scores of the upper and lower 27% of participants [31]. The level of statistical significance was set at $p < 0.05$.

Results

Participant characteristics

A total of 80 community-dwelling older adults, 41 (51.25%) females and 39 (48.75%) males, participated in the study. The mean age was 71.03 ± 6.45 years. Of the participants, 63.75% reported no falls and 36.25% of participants were fallers (at least one or more fall experience over the past 12 months). Twenty participants (25%) used an assistive device. The demographic and clinical characteristics of the participants are presented in Table 1. The mean score of FFABQ-T in the overall sample was 17.00 ± 16.33. The female, aged 75 years or older and faller participants had higher scores on the FFABQ-T than male, aged between 65 and 75 years and non-faller participants ($p < 0.05$, Table 2).

Table 1. Characteristics of the participants ($n = 80$).

Variable	*n* (%)	Mean ± SD (min–max)
Gender		
Male	39 (48.75)	
Female	41 (51.25)	
Age (years)		71.03 ± 6.45 (65–92)
65–74	59 (73.75)	
75–84	17 (21.25)	
85 and above	4 (5.00)	
Education		
Illiterate	19 (23.75)	
Literate	3 (3.75)	
Primary/secondary school	42 (52.50)	
High school	11 (13.75)	
University	5 (6.25)	
Civil status		
Married	59 (73.75)	
Single/divorced/widowed	21 (26.25)	
Employment status		
Retired	37 (46.25)	
Still working	6 (7.50)	
Did not work	37 (46.25)	
Living arrangements		
Living with spouse/relative	69 (86.25)	
Living alone	11 (13.75)	
Use of assistive device		
None	60 (75.00)	
Cane	15 (18.75)	
Walker	3 (3.75)	
Tripod	2 (2.50)	
Fall history over past 12 months		
None	51 (63.75)	
1	11 (13.75)	
≥2	18 (22.50)	
SMMT (0–30)		25.72 ± 2.21 (21–30)
Fear of falling (0–10)		3.51 ± 3.39 (0–10)
ABC scores (0–100)		63.89 ± 28.42 (3.10–99.37)
FFABQ-T score (0–56)		17.00 ± 16.33 (0–52)

ABC: Activities-specific Balance Confidence Scale; SMMT: Standardized Mini Mental Test; FFABQ-T: Fear of Falling Avoidance Behavior Questionnaire-Turkish version.

Table 2. FFABQ-T scores according to background variables.

	FFABQ-T scores: median, q1–q3 (min–max)	*p*	ICC
Gender		<0.001[a]	
Male	5, 1–20 (0–42)		0.998
Female	17, 6.5–41 (0–52)		0.999
Age		0.025[b]	
65–74	10, 1–26 (0–49)		0.999
75–85	21, 4.5–35 (0–52)		0.999
85 and above	35.50, 27.5–48.75 (27–51)		0.990
Fall history		0.001[a]	
None	5, 1–16.25 (0–51)		0.998
Yes	27, 13–42 (1–52)		0.999

FFABQ-T: Fear of Falling Avoidance Behavior Questionnaire-Turkish version; ICC: intraclass correlation coefficient.
[a]Mann–Whitney's *U* test.
[b]Kruskal–Wallis's test.

Cultural adaptation

As the FFABQ items were clear, the researchers did not encounter any difficulties during adaptation to Turkish. Only, "Getting in and out of a chair" (item 8) translates into Turkish "Bir sandalyeye girip çıkma," but this phrase is used as "Bir sandalyeye oturup kalkma." Therefore, item 8 was adapted as mentioned.

Internal consistency and test–retest reliability

Cronbach's alpha coefficient and item total score correlations were calculated to determine internal consistency. The internal consistency reliability of the overall FFABQ scores was high as indicated by Cronbach's alpha coefficient of 0.956. The item-total correlations ranged from 0.690 to 0.824. Cronbach's alpha ranged between 0.952 and 0.955, if the item deleted. The deletions did not cause an increase in the overall Cronbach's alpha; thus, no item was omitted. For the test–retest reliability, the ICC was calculated for total scores and each item on the FFABQ-T in 42 older adults. The test–retest reliability for the total FFABQ-T scores was found to be good (ICC = 0.999; 95% CI = 0.998–0.999). Similarly, the ICC values of each item were good (ranging from 0.972 to 0.997). Overall reliability analyses of the FFABQ-T items are shown in Table 3. The test–retest reliability of the questionnaire according to gender, age and fall history was also good (Table 2). The MDC_{95} was calculated as 4.51 points for the overall sample (95% CI = 2.88–6.14).

Validity

Convergent validity analyses revealed that the total score of FFABQ-T was negatively and strongly correlated with ABC total score ($r = -0.851$, $p < 0.001$), while the FFABQ-T score was positively and strongly correlated with FoF ($r = 0.700$, $p < 0.001$). A moderate positive correlation was found between FFABQ-T and the number of falls ($r = 0.528$, $p < 0.001$) (Table 4). When these Spearman's correlation coefficients are considered, the FFABQ-T has sufficient construct validity.

Kaiser–Meyer–Olkin and Bartlett's sphericity test results showed that the sample size was adequate (KMO = 0.907), and the items were appropriate (Bartlett's test of sphericity: $\chi^2 = 1008.652$, $p < 0.001$) for exploratory factor analysis, which was used to determine the construct validity. Explorative factor analyses identified two factors with eigenvalues greater than 1, and 73.33% of the variance was explained in total. We found that nine items (items 1–8, and 10) were loaded on factor 1, and five items were loaded on factor 2 (item 9 and items 11–14). The items with loadings are presented in Table 5.

Floor and ceiling effect

No floor and ceiling effect was found. While no participants scored the possible maximum score (56 points), 11 participants (13.5%) scored the possible minimum score (0 points).

Scale discrimination

The comparison of groups in the lower and upper 27% showed that the total scores of the FFABQ-T for participants in upper 27% (who have the most severe avoidance behavior among all participants) were greater than those in the lower 27% (who have no or minimal avoidance behavior among all participants) ($z = -5.607$, $p < 0.001$). This difference indicated that FFABQ-T could discriminate older adults with severe avoidance behavior from those without or with minimal avoidance behavior.

Discussion

The present study aimed to translate and adapt the FFABQ into Turkish based on guidelines for the cross-cultural adaptation of self-report measures [24] and establish the psychometric properties of FFABQ-T. Our results demonstrated that FFABQ-T is a reliable and valid measurement tool to assess the activity limitation and participation restriction due to FoF, and could be used to quantify avoidance behavior for community-dwelling older adults in the Turkish population.

Table 3. Item reliability analysis of the Fear of Falling Avoidance Behavior Questionnaire Turkish version: results of internal consistency and test–retest reliability ($n = 42$).

Items	Corrected item total correlation	Cronbach's alpha if item deleted	ICC (95% CI)
Item 1	0.748	0.954	0.997 (0.995–0.999)
Item 2	0.746	0.955	0.972 (0.948–0.985)
Item 3	0.824	0.952	0.995 (0.991–0.997)
Item 4	0.821	0.952	0.993 (0.986–0.996)
Item 5	0.818	0.952	0.995 (0.990–0.997)
Item 6	0.725	0.954	0.991 (0.983–0.995)
Item 7	0.778	0.953	0.978 (0.955–0.988)
Item 8	0.720	0.954	0.997 (0.994–0.998)
Item 9	0.745	0.954	0.993 (0.987–0.996)
Item 10	0.821	0.952	0.988 (0.978–0.994)
Item 11	0.690	0.955	0.980 (0.963–0.989)
Item 12	0.770	0.953	0.982 (0.961–0.989)
Item 13	0.780	0.953	0.997 (0.995–0.999)
Item 14	0.755	0.953	0.994 (0.988–0.997)

ICC: intraclass correlation coefficient; CI: confidence interval.

Table 4. Correlations of the Fear of Falling Avoidance Behavior Questionnaire Turkish version with ABC, number of falls and severity of fear of falling.

	FFABQ-T total score	
	r	*p*
ABC scores (0–64)	−0.851	<0.001
Number of falls	0.528	<0.001
Fear of falling (0–10)	0.700	<0.001

ABC: Activities-specific Balance Confidence Scale; FFABQ-T: Fear of Falling Avoidance Behavior Questionnaire-Turkish version; *r*: Spearman's correlation coefficient.

Table 5. Factor loadings of FFABQ-T items following oblimin rotation.

	Factor loading	
FFABQ items	Factor 1	Factor 2
10. Exercise	0.902	
5. Walking in crowded places	0.888	
2. Lifting and carrying objects (e.g., cup, child)	0.887	
3. Going up and down stairs	0.876	
6. Walking in dimly lit, unfamiliar places	0.818	
1. Walking	0.814	
4. Walking on different surfaces (e.g., grass, uneven ground)	0.792	
8. Getting in and out of a chair	0.714	
7. Leaving home	0.492	
12. Doing housework (e.g., cleaning, washing clothes)		0.944
11. Preparing meals (e.g., planning, cooking, serving)		0.937
14. Recreational and leisure activities (e.g., play, sports, arts and culture, crafts, hobbies, socializing, traveling)		0.848
13. Work or volunteer work		0.831
9. Showering or bathing		0.778
Eigenvalues	8.977	1.346
Explained variance	64.121	9.612

FFABQ: Fear of Falling Avoidance Behavior Questionnaire; FFABQ-T: Fear of Falling Avoidance Behavior Questionnaire-Turkish version.

Activity limitation and participation restriction due to FoF in subjects with fall history, lower balance confidence, and gait disorders emerge with functional decline, increased risk of falling, increased sedentary behavior [32], institutionalization, and decreased quality of life [11,33]. As the consequences of avoidance behavior relate to morbidity [34], the assessment and management of this behavior become critical. In the literature, different scales are used to determine the effect of FoF on activity and participation [13,20,35]. Although the Survey of Activities and Fear of Falling in the Elderly (SAFFE) is the most widely used scale in the clinic environment, it is known to be inadequate in predicting activity limitation and frequency of falls [36]. Furthermore, SAFFE is long and not practical for clinicians and researchers [37]. Unlike SAFFE, FFABQ is quite convenient for predicting falls in older adults [18], and moreover, its administration is very quick [20]. Therefore, we translated FFABQ into Turkish and investigated its psychometric properties in 80 community-dwelling older adults (only test–retest reliability was tested on 42 older adults), different from the original version which was tested on 63 older individuals.

The mean FFABQ-T score for the overall sample in the present study is 17.00 ± 16.33. The females and individuals aged $\geq$ 75 years in the Turkish population represented higher avoidance behavior, as measured using the FFABQ-T, when compared with males and individuals aged between 65 and 74 years. Moreover, this avoidance was the greatest in individuals aged over 84 years. Consistent with our results, Deshpande et al. [38] showed that advanced age and female gender were associated with greater activity restriction due to FoF. It is also known that previous falls increase the amount of avoidance behavior [39]. In line with this knowledge, the present study demonstrated that fallers represented more avoidance behavior than non-fallers. Similarly,

Landers et al. [20], developers of FFABQ, reported that fallers reported a greater amount of avoidance behavior compared with non-fallers. Moreover, frequent fallers, recent fallers, and injured fallers showed more activity restriction than nonfrequent, nonrecent, and uninjured fallers in the original English version [20]. Landers et al. [20] stated that FFABQ is valid for the mentioned groups based on this finding. Similarly, it can be said that FFABQ-T is valid with respect to background variables (gender, age, and fall history).

Internal consistency reliability of FFABQ-T was determined by Cronbach's alpha coefficient. Cronbach's alpha for total score was 0.956 and item-total correlations were between 0.690 and 0.824. These values indicate that FFABQ-T has a high level of internal inconsistency. The internal consistency of the FFABQ-T could not be discussed for the original version, because Landers et al. [20] only reported the test–retest reliability of FFABQ with an ICC value of 0.812. Additionally, it was reported that test–retest reliability (ICC = 0.751) was good for individuals with neurologic impairment. The test–retest reliability of the Turkish version (ICC = 0.999, items ICC = 0.972-0.997) was better than the original version. This difference between the two groups may be due to the fact that the original version contains a heterogeneous sample including individuals with neurological disorders. Furthermore, the results of the present study showed that FFABQ-T has good test–retest reliability for male, female, all age groups (>64 years), fallers and non-fallers. We found MDC_{95} value was as 4.51 which was lower than in the original version (MDC_{95} in the original version was 14.69). We think that the mean difference of 10.18 points for MDC_{95} can mainly be attributed to the difference between ICC values of Turkish and English version based on the formulae (SEM = standard deviation $\times \sqrt{}$(1 − ICC) and MDC_{95} = SEM $\times \sqrt{}2 \times 1.96$).

In the present study, convergent validity was evaluated with Spearman's correlation coefficient. The findings demonstrated that FFABQ-T has strong convergent validity with ABC, and FoF ($r = -0.851$, and $r = 0.700$, respectively). The correlations were in the expected direction, with more avoidance behaviors associated with increasing FoF and low balance confidence scores [40]. The strong negative correlation between FFABQ-T and ABC was valuable as it is known that the ABC is the best predictor of activity level in PD, and high ABC scores present the high level of activity for patients with PD [41]. Therefore, we could comment that the high FFABQ-T score may demonstrate a lower level of activity. Similar to our results, a negative strong correlation ($r = -0.678$) was found between FFABQ and ABC in the original version [20]. Unfortunately, the severity of FoF was not quantified in the original version. Thus, we could not discuss our finding, the strong positive correlation between FoF and avoidance behavior, with those in the English version of FFABQ. The number of falls in the past year was positive moderately correlated with the amount of avoidance behavior in both the English version of FFABQ and FFABQ-T ($r = 0.408$ and $r = 0.528$, respectively) [20]. These results in the present study confirm that FFABQ-T is a valid measurement tool.

Based on the results of exploratory factor analysis, the FFABQ-T has a structure of two factors. Factor 1 was related to activity limitation and participation restriction during the functions requiring challenging balance demands in daily life (e.g., going up and downstairs, walking on different surfaces, exercising, getting in and out of a chair). On the other hand, factor 2 was related to activity limitation and participation restriction during instrumental activities of daily living and socialization (e.g., showering or bathing, doing housework, recreational, and leisure activities). Landers et al. [20] did not perform factor analysis to explain the factor structure of FFABQ in the original version, hence we could not discuss the questionnaire structure. Further studies may address the structure of the questionnaire with our findings.

In the present study, we determined the properties of scale discrimination, and the floor and ceiling effect differently from the original version. The Turkish version of FFABQ had no floor and/or ceiling effect. The results of comparing upper-lower 27% groups indicate that FFABQ-T discriminates the severity of avoidance behavior depending on FFABQ-T total score.

This study has some limitations. The main limitation of the present study is that outcome measures were based on self-report. Another limitation is that the study sample comprised only community-dwelling older adults in three urban regions of Ordu; therefore, the results could not be generalized to all older adults. Further studies are needed to examine the psychometric properties using objective and clinical assessment in a larger and representative sample of all older adults. Additionally, there may be a possibility of recall bias about fall history over the past 12 months among older adults. On the other hand, the determination of almost all psychometric properties of the Turkish version (except minimal clinically important change and cut-off value) is the strength of the study. The mentioned lack of psychometric properties should be considered in future studies.

In conclusion, the findings of the present study demonstrated that FFABQ-T is a valid and reliable measurement tool to evaluate avoidance behavior due to FoF among community-dwelling Turkish older adults. FFABQ-T can be used to discriminate individuals whether they have a minor or significant problem relating to activity limitation and participation restriction. This tool can contribute to the assessment of fall risk. Moreover, it may be a utility outcome measure in determining the effectiveness of rehabilitation interventions, which are planned to increase activity levels and develop participation. Further studies are needed to investigate its utility in a large population with variable diagnoses and different ages (e.g., musculoskeletal problems, Parkinson's disease, stroke).

Acknowledgements

The authors thank the district governorship for permission for the study and the English linguistic scientist for back-translation.

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Sevim Acaröz Candan http://orcid.org/0000-0002-2617-8865
Arzu Demircioğlu http://orcid.org/0000-0003-3432-6343
Ülkü Kezban Şahin http://orcid.org/0000-0001-8972-4774

References

[1] Tinetti ME, Speechley M, Ginter SF. Risk factors for falls among elderly persons living in the community. N Engl J Med. 1988;319:1701–1707.
[2] Cuevas-Trisan R. Balance problems and fall risks in the elderly. Phys Med Rehabil Clin N Am. 2017;28:727–737.
[3] Morris R. Epidemiology of falls. Age Ageing. 2001;30:3–7.

[4] Nevitt MC, Cummings SR, Hudes ES. Risk factors for injurious falls: a prospective study. J Gerontol Med Sci. 1991;46:164–170.
[5] Stel VS, Smit JH, Pluijm SMF, et al. Consequences of falling in older men and women and risk factors for health service use and functional decline. Age Ageing. 2004;33:58–65.
[6] Stevens JA, Corso PS, Finkelstein EA, et al. The costs of fatal and non-fatal falls among older adults. Inj Prev. 2006;12:290–295.
[7] Czerwiński E, Białoszewski D, Borowy P, et al. Epidemiology, clinical significance, costs and fall prevention in elderly people. Ortop Traumatol Rehabil. 2008;10:419–428.
[8] Bandura A. Self-efficacy mechanism in human agency. Am Psychol. 1982;37:122–147.
[9] Tinetti ME, Powell L. Fear of falling and low self-efficacy: a cause of dependence in elderly persons. J Gerontol. 1993;48:35–38.
[10] Powell LE, Myers AM. The Activities-specific Balance Confidence (ABC) scale. J Gerontol Med Sci. 1995;50:28–34.
[11] Scheffer AC, Schuurmans MJ, Van Dijk N, et al. Fear of falling: measurement strategy, prevalence, risk factors and consequences among older persons. Age Ageing. 2008;37:19–24.
[12] Gazibara T, Kurtagic I, Kisic-Tepavcevic D, et al. Falls, risk factors and fear of falling among persons older than 65 years of age. Psychogeriatrics. 2017;17:215–223.
[13] Yardley L, Smith H. A prospective study of the relationship between feared consequences of falling and avoidance of activity in community-living older people. Gerontologist. 2002;42:17–23.
[14] Howland J, Peterson WE, Levin WC, et al. Fear of falling among the community-dwelling elderly. J Aging Health. 1993;5:229–243.
[15] Bertera EM, Bertera RL. Fear of falling and activity avoidance in a national sample of older adults in the United States. Heal Soc Work. 2008;33:54–62.
[16] Choi K, Jeon GS, Cho S. Prospective study on the impact of fear of falling on functional decline among community dwelling elderly women. Int J Environ Res Public Health. 2017;14:469.
[17] Kumar A, Carpenter H, Morris R, et al. Which factors are associated with fear of falling in community-dwelling older people? Age Ageing. 2014;43:76–84.
[18] Landers MR, Oscar S, Sasaoka J, et al. Balance confidence and fear of falling avoidance behavior are most predictive of falling in older adults: prospective analysis. Phys Ther. 2016;96:433–442.
[19] World Health Organization. International classification of functioning, disability and health: ICF. Geneva: WHO; 2001.
[20] Landers MR, Durand C, Powell DS, et al. Development of a scale to assess avoidance behavior due to a fear of falling: the Fear of Falling Avoidance Behavior Questionnaire. Phys Ther. 2011;91:1253–1265.
[21] Berg K, Wood-Dauphinee S, Williams JI, et al. Measuring balance in the elderly: preliminary development of an instrument. Physiother Can. 1989;41:304–311.
[22] Tinetti ME, Richman D, Powell L. Falls efficacy as a measure of fear of falling. J Gerontol Psychol Sci. 1990;45:239–243.
[23] Folstein M, Folstein S, McHugh P. "Mini-Mental State": a practical state method for grading the cognitive state of patients for the clinician. J Psychiatr Res. 1975;12:189–198.
[24] Beaton DE, Bombardier C, Guillemin F, et al. Guidelines for the process of cross-cultural adaptation. Spine (Phila Pa 1976). 2000;25:3186–3191.
[25] Bland J, Altman D. Statistics notes Cronbach's alpha. BMJ. 1997;314:572.
[26] Andresen EM. Criteria for assessing the tools of disability outcomes research. Arch Phys Med Rehabil. 2000;81:15–20.
[27] Stratford P. Getting more from the literature: estimating the standard error of measurement from reliability studies. Physiother Can. 2004;56:27–30.
[28] Bland JM, Altman DG. Measuring agreement in method comparison studies. Stat Methods Med Res. 1999;8:135–160.
[29] Beavers AS, Lounsbury JW, Richards JK, et al. Practical considerations for using exploratory factor analysis in educational research. Pr Assess Res Eval. 2013;18:1–13.
[30] Terwee CB, Bot SDM, de Boer MR, et al. Quality criteria were proposed for measurement properties of health status questionnaires. J Clin Epidemiol. 2007;60:34–42.
[31] Kelly T. The selection of upper and lower groups for the validation of test items. J Educ Psychol. 1939;30:17–24.
[32] Stubbs B, Patchay S, Soundy A, et al. The avoidance of activities due to fear of falling contributes to sedentary behavior among community-dwelling older adults with chronic musculoskeletal pain: a multisite observational study. Pain Med. 2014;15:1861–1871.
[33] Chang NT, Chi LY, Yang NP, et al. The impact of falls and fear of falling on health-related quality of life in Taiwanese elderly. J Community Health Nurs. 2010;27:84–95.
[34] Spaniolas K, Cheng JD, Gestring ML, et al. Ground level falls are associated with significant mortality in elderly patients. J Trauma. 2010;69:821–824.
[35] Lachman ME, Howland J, Tennstedt S, et al. Fear of falling and activity restriction: the Survey of Activities and Fear of Falling in the Elderly (SAFE). J Gerontol B Psychol Sci Soc Sci. 1998;53:43–50.
[36] Hotchkiss A, Fisher A, Robertson R, et al. Convergent and predictive validity of three scales related to falls in the elderly. Am J Occup Ther. 2004;58:100–103.
[37] Moore DS, Ellis R. Measurement of fall-related psychological constructs among independent-living older adults: a review of the research literature. Aging Ment Health. 2008;12:684–699.
[38] Deshpande N, Metter EJ, Lauretani F, et al. Activity restriction induced by fear of falling and objective and subjective measures of physical function: a prospective cohort study. J Am Geriatr Soc. 2008;56:615–620.
[39] Delbaere K, Crombez G, Vanderstraeten G, et al. Fear-related avoidance of activities, falls and physical frailty. A prospective community-based cohort study. Age Ageing. 2004;33:368–373.
[40] Filiatrault J, Demers L, Parisien M, et al. Development and validation of a French Canadian version of the falls Behavioral (FaB) Scale. Disabil Rehabil. 2014;36:1798–1803.
[41] Myers AM, Powell LE, Maki BE, et al. Psychological indicators of balance confidence: relationship to actual and perceived abilities. J Gerontol A Biol Sci Med Sci. 1996;51:37–43.

Appendix. Turkish version of Fear of Falling Avoidance Behavior Questionnaire

Düşme Korkusu Kaçınma-Davranış Anketi (DKKDA)

Lütfen dengenizle ilgili aşağıdaki soruları cevaplayınız. Her bir ifade için, düşme korkusunun sizi nasıl etkilediğini veya

etkilemediğini söylemek için lütfen bir kutuyu işaretleyin. Sorulardaki aktiviteleri şu anda yapmıyorsanız, düşme korkusunun bu aktivitelere katılımınızı nasıl etkileyeceğini düşünün. Normalde bu aktiviteleri yapmak için bir yürüme yardımcısı kullanıyorsanız veya birine tutunuyorsanız bu destekleri kullanmıyormuşsunuz gibi düşme korkusunun sizi nasıl etkileyeceğini değerlendirin. Bu ifadelerin herhangi birini yanıtlama konusunda sorularınız varsa, lütfen anketi uygulayan kişiye sorun.

Düşme korkumdan dolayı, kaçınırım	Hiç (Zamanın %0'ı)	Nadiren (Zamanın %25'i)	Bazen (Zamanın %50'si)	Genellikle (Zamanın %75'i)	Her zaman (Zamanın %100'ü)
1. Yürüme	☐	☐	☐	☐	☐
2. Objeleri kaldırma ve taşıma (örn., fincan, çocuk)	☐	☐	☐	☐	☐
3. Yukarı ve aşağı merdiven çıkıp inme	☐	☐	☐	☐	☐
4. Farklı yüzeylerde yürüme (örn., çim, düzgün olmayan zemin)	☐	☐	☐	☐	☐
5. Kalabalık yerlerde yürüme	☐	☐	☐	☐	☐
6. Az ışıklı, alışık olunmayan zeminlerde yürüme	☐	☐	☐	☐	☐
7. Evden çıkma	☐	☐	☐	☐	☐
8. Bir sandalyeye oturup kalkma	☐	☐	☐	☐	☐
9. Duş ve/veya banyo	☐	☐	☐	☐	☐
10. Egzersiz	☐	☐	☐	☐	☐
11. Yemek hazırlama (örn., planlama, pişirme ve servis yapma)	☐	☐	☐	☐	☐
12. Ev işleri yapma (temizleme, çamaşırları yıkama)	☐	☐	☐	☐	☐
13. İş ve/veya gönüllü iş	☐	☐	☐	☐	☐
14. Rekreasyonel ve boş zaman aktiviteleri (örn., oyun, spor, sanat ve kültür, el sanatları, hobiler, sosyalleşme, seyahat)	☐	☐	☐	☐	☐