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## RESEARCH

# THE TURKISH VERSION OF THE ACTIVITIES SPECIFIC BALANCE CONFIDENCE (ABC) SCALE: ITS CULTURAL ADAPTATION, VALIDATION AND RELIABILITY IN OLDER ADULTS

### ABSTRACT

**Introduction:** To describe the cultural adaptation of the Turkish Activities Specific Balance Confidence Scale and to examine the factor structure, reliability and validity of the scale in older adults.

**Materials and Method:** One hundred and six elderly people were recruited in the study. The assessments included the Turkish Activities Specific Balance Confidence Scale, Falls Efficacy Scale, Berg Balance Scale, Mini Mental State Test, Yesavage Geriatric Depression Scale, and Short Form-36 (physical function and mental health subgroups). Outcome measures were conducted twice within 2 weeks (test-retest) for reliability.

**Results:** The Cronbach's  $\alpha$  coefficient was 0.9649 for the test and 0.9648 for the re-test. The Intraclass Correlation Coefficient for the test-retest reliability was 0.997 with 95% confidence interval 0.996-0.998. A strong negative correlation was found between the Turkish Activities Specific Balance Confidence Scale and the Falls Efficacy Scale ( $r=-0.835$ ,  $p<0.001$ ). There were strong positive correlations between the scale and the physical function subgroup of the Short Form-36 ( $r=0.614$ ,  $p<0.001$ ), and the Berg Balance Scale ( $r=0.748$ ,  $p<0.001$ ). No significant correlation was found between the scale and the mental health subgroup of the Short Form-36 ( $r=-0.110$ ,  $p=0.262$ ). Results of a factor analysis conducted on the scale showed evidence of a 2-domain structure.

**Conclusion:** The Turkish Activities Specific Balance Confidence Scale showed excellent reliability and good validity. It can be suggested that the scale promises to be useful and practical when used with different groups of elderly for the assessment and management of balance confidence.

**Key Words:** Aged; Accidental Falls, Postural Balance; Fear; Outcome Assessment (Health Care).



## ARAŞTIRMA

# AKTİVİTEYE ÖZGÜ DENGE GÜVEN ÖLÇEĞİNİN TÜRKÇE VERSİYONU: YAŞLI BİREYLERDE KÜLTÜREL ADAPTASYON, GÜVENİRLİK VE GEÇERLİK ÇALIŞMASI

### Öz

**Giriş:** Bu çalışmanın amacı, Aktiviteye Özgü Denge Güven Ölçeğinin Türkçe kültürel adaptasyonunu yapmak ve yaşlı bireylerde faktöriyel yapısını geçerlik ve güvenilirlik özelliklerini test etmektir.

**Gereç ve Yöntem:** Çalışmaya katılmayı kabul eden 106 yaşlı birey dahil edildi. Değerlendirme kapsamında Aktiviteye Özgü Denge Güven Ölçeği, Düşme Etkinlik Ölçeği, Berg Denge Ölçeği, Mini Mental Durum Testi, Geriatrik Depresyon Ölçeği, Kısa Form-36'nın Fiziksel fonksiyon ve Mental sağlık alt başlıkları yer aldı. Ölçekler test-tekrar test güvenilirliği değerlendirmek için iki hafta arayla tekrarlandı.

**Bulgular:** İç tutarlılıkta, Cronbach alfa değeri, test için 0.9649, ve tekrar test için 0.9648 olarak belirlendi. Aktiviteye Özgü Denge Güven Ölçeğinin tekrar test güvenilirliği (Intraclass Correlation Coefficient) 0,997, % 95 güven aralığı 0,996-0,998 olarak bulundu. Ölçütsel geçerlik yönünden, Aktiviteye Özgü Denge Güven Ölçeği ve Düşme Etkinlik Ölçeği ( $r=-0,835$ ,  $p<0,001$ ) arasında negatif ilişki kaydedildi. Aktiviteye Özgü Denge Güven Ölçeği, Kısa Form-36 Fiziksel fonksiyon alt başlığı ( $r=0,614$ ,  $p<0,001$ ) ve Berg Denge Ölçeği ( $r=0,748$ ,  $p<0,001$ ) arasında pozitif yönde ilişki saptandı. Aktiviteye Özgü Denge Güven Ölçeği ve Kısa Form-36 mental sağlık arasında herhangi bir ilişki ( $r=-0,110$ ,  $p=0,262$ ) saptanmadı. Kullanılan faktör analizi iki faktörün belirlenmesi ile sonuçlandı.

**Sonuç:** Bu çalışma, Aktiviteye Özgü Denge Güven Ölçeğinin yaşlı bireylerde kabul edilebilir derecede güvenilir ve geçerli olduğunu gösterdi. Aktiviteye Özgü Denge Güven Ölçeği, yaşlı bireylerin denge güven durumunun değerlendirme ve tedavisinde kullanılabilecek yararlı ve kullanımı kolay bir ölçektir.

**Anahtar Sözcükler:** Yaşlı; Düşmeler; Denge; Korku; Ölçekler.

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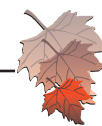
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## INTRODUCTION

The occurrence of “fear of falling” (FOF) among non-falling elderly is between 12% and 65%; while it is between 29% and 92% among elderly who have fallen. FOF, which is multifactorial in etiology, may lead to serious physical, psychological and social problems in the elderly (1). Activity restriction, decreased mobility, social isolation, anxiety, and depression are the most important consequences of the FOF (1,2).

In recent years there has been a growing focus on the measurement of FOF in the elderly with a view to developing prevention and rehabilitation management strategies (3). Tinetti (1990) has defined fall-related self-efficacy or balance confidence as people’s personal beliefs about their own abilities to perform certain activities (4). The Fall Efficacy Scale (FES) is the first developed scale to be reported in the literature; it focuses on the performance of indoor activities by the elderly. This scale was reported to have a high level of test-retest reliability and internal consistency (5). However, the FES measures only simple indoor activities and does not provide information about more difficult and complex outdoor activities.

The Activity Specific Balance Confidence Scale (ABC) is an alternative scale for assessing FOF, developed by Powell and Myers. The ABC scale was designed to measure subjective balance confidence for both indoor and outdoor activities in ambulatory community-dwelling elderly (6). Up to now, this scale has been translated into many languages (7-14). Previous studies have reported that the ABC scale has good psychometric properties with high internal consistency and test-retest reliability.

The Turkish version of the ABC scale (ABC-T) was used by Karapolat et al. (2010) on patients with unilateral peripheral vestibular diseases, which demonstrated acceptable measurement properties (15). The aim of this study was to produce a cross-cultural adaptation of the scale and to test the psychometric quality of the scale in elderly participants.

## MATERIALS AND METHOD

### Participants

One hundred and six elderly people who agreed to participate in the study were recruited from hospital units. Inclusion criteria for the study were that participants were over age 65, volunteered for the study, were able to stand independently and unsupported for 90 seconds, and were cognitively able to

communicate adequately. Participants whose mother language was not Turkish, who had malignancy, and who had hearing or vision loss were excluded from the study. All participants were asked to sign an informed consent form and were informed about the study prior to its start. The study was approved by the Research Ethics Board.

Demographic data of the participants, including age, gender, history of falls and detailed medical history were recorded at the baseline assessment. All assessments were made during face-to-face interviews including Mini Mental State Test (MMST), Short Form 36 (SF-36) Mental Health subgroup and Yesavage Geriatric Depression Scale (GDS). Balance-related assessments included ABC scale, FES, Berg Balance Scale (BBS) and SF-36 Physical Function subgroup. ABC, FES, BBS, GDS and SF-36 tests were made twice within 2 weeks. All assessments were completed on the same day.

### Activity Specific Balance Confidence Scale (ABC)

The ABC scale was developed by Powell and Myers. This scale contains 16 tasks related to indoor and outdoor daily living activities, to measure balance confidence in elderly people who have various levels of functioning. Scores range from 0% (no confidence) to 100% (complete confidence) for each question item. Higher scores indicate greater confidence (6).

The cross-cultural adaptation process of the ABC scale was performed by following the guidelines provided by Beaton et al (16). Those guidelines are as follows: First, two independent translators performed the forward translations from English to Turkish. The translations were compared and discrepancies were resolved. Second, bilingual translators, whose mother language was English, back translated the same version. Although one of the translators was aware of the study, the other translator was not aware of it. Third, the two back-translations were synthesized by the authors to achieve a consensus. Finally, a second meeting was held with participation of all the interested professionals. This team reviewed the English and Turkish versions of the translations to control for and pinpoint possible meaning differences and inconsistencies. A final version was established and field tested on 30 elderly adults after a number of slight corrections and changes by consensus.

### Mini Mental State Test (MMST)

The MMST evaluates the cognitive status of the elderly. It contained seven domains, each with an assigned point value totaling 30. MMST scores higher than or equal to 24 were considered as normal cognitive function, while scores lower



than 24 indicated cognitive impairment. Low MMST scores have also been associated with an increased fall risk in elderly adults (17).

### Yesavage Geriatric Depression Scale (GDS)

The GDS consists of 30 questions to be answered as “yes” or “no”, with a maximum score of 30 points. The Turkish version of the GDS was used in this study. GDS scores equal to or higher than 6 were considered to indicate clinically significant depression (18).

### Berg Balance Scale (BBS)

The BBS is a 14-item scale that measures sitting, standing and postural changes while performing tasks. Each task is scored from 0 points to 4 points. Higher scores indicate better balance control. Scores of 0-20 indicate a high fall risk, 21-40 indicates a medium fall risk, and 41-56 indicates a low fall risk (19).

### Tinetti Falls Efficacy Scale (FES)

The FES was designed to assess the level of self-perceived FOF during the performance of daily living activities by the elderly. The FES consists of 10 simple indoor activities rated on a 10-point scale. The scores are summed to give a total score ranging from 10 to 100 points, where lower scores indicate a low level of confidence. Tinetti reported a test-retest reliability for the FES in a community-based elderly population of  $r=0.71$  (5).

### Short Form-36 Quality of Life Questionnaire

The SF-36 was developed by the RAND Corporation and the Medical Outcomes Study (20). SF-36 has eight subgroups with a total of 36 questions. The Turkish version of the SF-36 has shown acceptable measurement properties (21). “Physical Function” and “Mental Health” subtests of the SF-36 were used in this study. Higher scores indicate higher levels of health.

### Falls

A fall history was obtained from the responses to the question “How many times did you fall during the past year?” (22). Falls were recorded as numbers.

### Statistical Analysis

All analyses were conducted using the Statistical Package for the Social Sciences 15.00 (SPSS Inc., Chicago, USA). The

variables were expressed in terms of arithmetic means (X) and standard deviation (SD) values. The critical level of significance was set at  $p<0.05$ .

The psychometric properties of the ABC scale were evaluated in terms of reliability and validity. Test-retest reliability was determined by calculating the intraclass correlation coefficient (ICC), which shows the strength of agreement. ICC values are defined as fair ( $<0.40$ ), moderate (0.40-0.59), substantial (0.60-0.79), and excellent ( $\geq 0.80$ ). Internal consistency, which means that all items of the scale measure aspects of a single construct, was assessed using Cronbach’s alpha, which is expected to be above 0.70. A Pearson correlation coefficient was used to assess the strength of the linear relationships. (23)

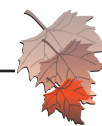
Concurrent convergent validity refers to the extent to which an instrument correlates with other measures of the same construct, which it is theoretically predicted to correlate with. Concurrent convergent validity of the ABC scale with other measures was estimated using Pearson’s correlation coefficient. The correlation between the ABC scale and the FES (taken as a criterion variable), which is referred as criterion validity, was performed. Construct validity was evaluated by the principal component and factor analysis method.

## RESULTS

One hundred and six elderly people between the ages of 65 and 88, with an average of  $69.52\pm 5.17$  years, were included in the study as subjects, of which 49 (46%) were females and 57 (54%) were males. Demographic data of the participants are shown in Table 1. The scores on the FSS, MSS, GDS and FES are also shown in Table 1.

**Content Equivalence of ABC-T Scale:** Three of the 16 items on the ABC scale were found to be culturally irrelevant due to differences in the physical living environment and climate in Turkey. First, in item 4 we used the term “height level” instead of “eye level”. This is a more common expression in Turkey. In item 8, “to a car parked in the driveway” was modified as “to the street”, as most elderly people do not use a car for transportation in Turkey, and they usually live in a house without a driveway. In item 16 we replaced “icy sidewalks” with “slippery sidewalks” because of the climate of Turkey. The three modified questions are summarized in Table 2.

**Reliability:** The Cronbach’s  $\alpha$  coefficients for the ABC Scale were 0.9649 for the test and 0.9648 for the re-test, which indicated a higher internal consistency than was expected. Item-total correlations for all items ranged from 0.578 to



**Table 1—** Demographic Characteristics of the Participants.

	Participants (n=106)
<b>Age</b> (years) (X±SD)	69.52±5.17
65-74 (n (%))	88 (83.0)
75-84 (n (%))	17 (16.0)
85< (n (%))	1 (1.0)
<b>Height</b> (cm) (X±SD)	165.34±8.99
<b>Body weight</b> (kg) (X±SD)	77.03±12.81
<b>Body Mass Index</b> (kg/m <sup>2</sup> ) (X±SD)	28.31±5.23
<b>MMST</b> (0-30) (X±SD)	29.76±0.43
<b>Falls during twelve months</b> (n (%))	
Non fallers	48 (45.3)
Fallers	
1 time	25(23.6)
2 times	16 (15.1)
3 times	8 (7.5)
4 times	9 (8.5)
<b>ABC</b> (0-100)	86.97±22
<b>BBS</b> (0-56)	53.91±3.71
<b>FSS</b> (0-100)	47.38±12.96
<b>MSS</b> (0-100)	46.17±6.78
<b>GDS</b> (0-30)	3.14±2.56
<b>FES</b> (10-100)	23.75±21.49

MMST: Mini Mental State Test, BBS: Berg Balance Scale, FSS: Physical function subgroup of SF-36, MSS: Mental health subgroup of SF-36, GDS: Geriatric Depression Scale, FES: Falls Efficacy Scale.

0.894, which demonstrates moderately strong evidence (Table 3). The ICC for the test–retest reliability of the ABC Scale was 0.997, with a 95% confidence interval (CI) 0.996–0.998, which suggested reasonably high test-retest reliability for the ABC Scale (Table 3). The ICC values for individual items ranged from 0.962 to 0.999, with the highest ICC value for item 15 (Step onto or off an escalator while holding onto parcels such that you cannot hold onto the railing) and the lowest value for item 2 (Walk up or down stairs) (Table 3).

**Convergent Validity:** The total score of the ABC scale was negatively correlated with a history of falls ( $r=-0.770$ ,  $p<0.001$ ). There were high positive correlations between ABC scores and the physical function subgroup score of the SF-36 ( $r=0.614$ ,  $p<0.001$ ), and the BBS ( $r=0.748$ ,  $p<0.001$ ). There was no significant correlation between ABC scores and the mental health subgroup score of SF-36 ( $r=-0.110$ ,  $p=0.262$ ).

**Criterion Validity:** There was a high negative correlation between ABC scores and FES scores ( $r=-0.835$ ,  $p<0.001$ ).

**Table 2—** Results of the Cultural Adaptation of the ABC Scale.

Original Items of The ABC Scale	Modified items of the ABC-T Scale
4. Reach for a small can off a shelf at eye level?	Reach for a small can off a shelf at height level?
8. Walk outside the house to a car parked in the driveway?	Walk outside the house to the street?
16. Walk outside on icy sidewalks?	Walk outside on slippery sidewalks?

**Construct Validity:** The ABC scale was factor analyzed using principal component analysis with Varimax (orthogonal) rotation. The Kaiser–Meyer Olkin value was 0.849,  $p=0.000$ , which suggested that the sample was factorable. Chi-square was 2514.168 (120 degrees of freedom,  $p<0.001$ ) in Bartlett’s test of sphericity, indicating that the correlation matrix was an identity matrix. The analysis yielded two factors, explaining a total matrix variance of 78.629% (Table 4). The factor analysis was performed without imposing any preconceived structure on the outcome. Two factors were extracted, as was estimated in the theoretical phase. Seven items, numbers 7,11,12,13,14,15,16, were loaded onto Factor 1. This factor was labeled “Attentional demands activities” and explained 68.651% of the variance (Table 4). Factor 2 was labeled “Simple demands activities” due to high loadings on tasks numbered 1,2,3,4,5,6,8,9,10. This factor explained 9.978% of the variance (Table 4).

## DISCUSSION

Balance confidence is an important issue among the elderly population in terms of functional mobility, participation and personal well-being. The present study investigated the psychometric properties and factorial analysis of the ABC-T in elderly participants. The results of the study indicate that the Turkish ABC scale has strong measurement properties, which make it a reliable and valid instrument for research and practice.

Test-retest reliability indicates whether the items of the ABC scale measure a single construct or not. In the original study, test–retest reliability of the ABC Scale in community dwelling older people was high (ICC=0.92). Similarly, in other studies performed on elderly adults, the ICC values ranged from 0.73 to 0.98. Test-retest reliability was found to vary between 0.67 to 0.92 in the Turkish version of the scale. In this study, the ABC scale has high test-retest reliability



**Table 3—** Test-retest Reliability and Item Total Correlations of the Turkish Version of the ABC Scale.

	r	ICC	95% CI	
			Lower	Upper
1. Walk around the house?	0.887*	0.970	0.9562	0.9795
2. Walk up or down stairs?	0.875*	0.962	0.9449	0.9741
3. Bend over and pick up a slipper from the front of a closet floor?	0.821*	0.987	0.9817	0.9915
4. Reach for a small can off a shelf at height level?	0.578*	0.993	0.9911	0.9958
5. Stand on your tiptoes and reach for something above your head?	0.817*	0.985	0.9785	0.9900
6. Stand on a chair and reach for something?	0.817*	0.997	0.9957	0.9980
7. Sweep the floor?	0.811*	0.998	0.9978	0.9990
8. Walk outside the house to the street?	0.870*	0.998	0.9974	0.9988
9. Get into or out of a car?	0.853*	0.987	0.9815	0.9913
10. Walk across a parking lot to the mall?	0.894*	0.989	0.9843	0.9927
11. Walk up or down a ramp?	0.890*	0.994	0.9919	0.9962
12. Walk in a crowded mall where people rapidly walk past you?	0.843	0.997	0.9967	0.9985
13. Are bumped into by people as you walk through the mall?	0.891*	0.998	0.9983	0.9992
14. Step onto or off of an escalator while holding onto a railing?	0.790*	0.993	0.9911	0.9958
15. Step onto or off an escalator while holding onto parcels such that you cannot hold onto the railing?	0.746*	0.999	0.9985	0.9993
16. Walk outside on slippery sidewalks?	0.806*	0.993	0.9897	0.9952
Total		0.997	0.9967	0.998

r , Pearson correlation coefficient, item-total correlation

\*p<0.001

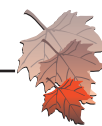
ICC, intraclass correlation coefficient

CI, Confidence interval

**Table 4—** Varimax Rotated 2-Factor Solution of the ABC Scale.

Item nb.	Factor loadings of Factor 1		Factor loadings of Factor 2	
	Attentional Demands Activities		Simple Demands Activities	
15	0.936		0.083	
13	0.852		0.381	
16	0.839		0.263	
11	0.820		0.417	
14	0.773		0.330	
12	0.742		0.444	
7	0.697		0.424	
4	-0.042		0.921	
3	0.343		0.852	
1	0.484		0.787	
2	0.466		0.781	
10	0.577		0.710	
6	0.477		0.663	
8	0.588		0.653	
9	0.587		0.636	
5	0.569		0.606	

The total percentage of matrix variance is 78.629.



(ranged from 0.962 to 0.999), similar to that found in other studies performed with the community dwelling elderly.

The ABC scale has shown high internal consistency with community-dwelling older people in previous studies (6,8-12). The Cronbach's alpha of Turkish version of ABC scale performed in patients with unilateral peripheral vestibular dysfunction also showed high internal consistency with a value of 0.95 (15). In line with the previous studies the Turkish ABC scale showed high internal consistency in older adults in this study.

Results of the factor analysis in the Chinese Cantonese version of the ABC scale showed evidence of a coherent 1-domain structure (11); however, two factors were extracted in the Chinese Mandarin version (12). Botner et al. also calculated 2 factors that were labeled according to the levels of perceived risk (24). Similarly, in this study two factors were extracted. The first factor, which was labeled "attentional demands activities", mostly, included difficult outdoor activities. The second factor, which was labeled "simple demands activities", included simple activities. Tasks such as walking outside on icy sidewalks, walking up or down a ramp, stepping onto or off an escalator, etc. need more postural control with respect to the difficulty of the task, environmental influences and unstable sensory information. The attentional demands of balance control vary according to the complexity of the situation. Balance control in the elderly, following an external perturbation, requires more attention than it does for younger adults; hence, increased attentional requirements of certain activities could affect task execution (25).

In the study by Karapolat, significant correlation was observed between the Turkish ABC scale and, Dizziness Handicap Inventory but no correlation was found with the other tests including various balance and gait outcome measures. The lack of correlation was explained with the balance problems in patients with peripheral vestibular disease (15). However, the ABC scale demonstrated good convergent and criterion validity in community dwelling older people. The original scale and the French Canadian version of the scale, used among people with stroke, showed a moderate level of correlation with BBS comfortable and maximum gait speeds, Time Up and Go Test (TUG), 6 Minutes Walking Test (6MWT), the Barthel Index and the GDS (13). Concurrent validity between the ABC and the physical performance tests and self-reported health status were significant. Thus, it was suggested that the scale might be used for rehabilitation targeting to improve physical function. Similarly, in this study there was a positive correlation between ABC scores and the

physical function subgroup of the SF-36 ( $r=0.614$ ,  $p<0.001$ ); BBS ( $r=0.748$ ,  $p<0.001$ ); and FES ( $r=-0.835$ ,  $p<0.001$ ). In addition, there was a significant difference in the German version of the ABC scores between the fallers and non-fallers, the fallers having lower scores than the non-fallers (10). In this study, a significant correlation was found between scores on the ABC scale and the patient's history of falls ( $r=-0.770$ ,  $p<0.001$ ).

Divergent validity was established by correlating the ABC and mental health subgroup scores of the SF-36 in a study of Ylva (14). No significant correlation between these scores ( $r=0.110$ ,  $p=0.262$ ) was found.

The incidence of balance problems and falls in the elderly is associated with the severity of FOF. Therefore, the measurement of FOF should be complementary to geriatric assessments with respect to fall management. This study analyzed the psychometric qualities of the ABC-Tin terms of reliability, validity and factorial structure. The results showed that the scale had excellent reliability and good validity. In conclusion, the ABC-T appears to be a promising tool to use with different elderly groups for the assessment and management of balance confidence.

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