

RESEARCH ARTICLE

Psychometric evaluation of Persian version of Activities-specific Balance Confidence Scale for elderly Persians

Hoory Hassan¹, Homa Zarrinkoob^{1*}, Sadegh Jafarzadeh², Alireza Akbarzade Baghban³

¹ - Department of Audiology, Faculty of Rehabilitation Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran

² - Department of Audiology, School of Rehabilitation, Tehran University of Medical Sciences, Iran

³ - Department of Basic Sciences, Faculty of Rehabilitation Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran

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Abstract

Background and Aim: Disequilibrium is a common complaint in the elderly. The activities-specific balance confidence (ABC) scale is a suitable tool for assessing the level of confidence in balance whilst performing daily activities. The purpose of the study was translation, cultural adaptation and evaluation of the reliability and validity of the Activities-Specific Balance Confidence Scale for elderly Persians.

Methods: This was a descriptive, cross-sectional (test development) study. The ABC scale was translated based on the native protocol of the international quality of life assessment and was adapted to conditions found in Iranian culture. Upon confirmation of face validity, the questionnaire was given to 142 Persians aged between 60 and 92 years, selected via simple sampling. After one week, 56 participants were asked to complete the questionnaire again. Finally, reliability was evaluated using internal consistency and test-retest reproducibility.

Results: Three items out of 16 were modified to adapt the scale to Iranian culture. Changes were approved by the original author. Reliability was

confirmed using a Cronbach alpha coefficient of 0.96 and an Intraclass correlation coefficient of 0.97.

Conclusion: The Persian version of the ABC scale is equivalent to the original content of the scale. In addition, it is compliant with the terms of Persian culture. It has high validity and reliability. It is suitable for assessing the level of balance confidence in the elderly in clinical or research settings.

Keywords: Psychometrics, activities-specific balance confidence scale, elderly, Persian, validity, reliability

Introduction

Disequilibrium and dizziness are the most common disorders of old age [1]. In general, aging process leads to biological changes in the body different cells, and after that gradual changes occur in the structure and function of various parts, including organs involved in maintaining balance [2]. Imbalance in the elderly can be divided into two factors: internal and external. Internal factors include disorder in different body organs (such as vision, musculoskeletal and vestibular systems), psychological disorders and complex medications. External factors are related to the environment. Due to the complexity of the concept of equilibrium, and the factors causing

* **Corresponding author:** Department of Audiology, Faculty of Rehabilitation Sciences, Shahid Beheshti University of Medical Sciences, Damavand Ave., Tehran, 1616913111, Iran. Tel: 009821-77561724, E-mail: zarrinkoob.h@sbmu.ac.ir

imbalance in the elderly, the general term imbalance caused by aging (presbyastasis) is used to describe imbalance in old age [1]. One of the most common consequences of an imbalance in the elderly is falling down. Moeller et al. suggest that 30 to 50% of people over age 65 experience fall each year and its prevalence increases with increasing age and balance disorders [1]. However, these figures are probably lower than the actual value because often only cases of falls resulting in bodily injury or loss of performance requirements are recorded. The prevalence of cases such as fractures, soft tissue injury, dislocation of joints and movement disorders have been reported in 15 to 20% of cases. Psychological disorders are also the consequences of falls that reduce the activity and independence of older people and are destructive effects of physical damage [1]. Legters reported that in various individuals who have experienced falls, there is loss of confidence in balance and fear of falling (with an incidence of 50 to 60%) that in the 25 to 33% of them, this fear leads to avoiding behavior. Moreover, fear of falling is observed between 12 to 65% of elderly who do not have a history of falls or injuries [3].

According to the study of Glover and Prideaux, the number of elderly in the world in 2006 is estimated at about 688 million people and it is predicted that by 2050 this figure will increase up to 2 billion. That includes about 20% of the world's total population [4]. Therefore, due to the growing elderly population in the world, dealing with common problems in old age and its consequences seems necessary. To fix balance disorders one should consider the relationship between equilibrium organ damage, and executive dysfunction and its consequences in patient's life. To identify and assess the impairment, various balance tests such as posturography, electrocochleography (ECOG), and videonystagmography (VNG) are used. However, for better management and appropriate interventions, acquisition of information on balance disorders, lifestyles and self-perceived disability is also necessary [5]. In this area, there are a number of standardized

questionnaires that measure the effect of balance disorders on the individuals' performance [3]. One questionnaire appropriate for study of the elderly to ensure their balance is activities-specific balance confidence (ABC) scale consisting of 16 questions on specific activities. ABC is introduced in 1995 by Powell and Myers in University of Waterloo in Ontario, Canada, to measure balance confidence of older people. In this test, subjects are asked to trust their balance while performing 16 activities with different levels of difficulty rated based on a scale of zero to 100 [2]. Average score will be considered as a final point. This standardized questionnaire has been widely translated into Korean [6], Chinese [7], Swedish [8], French [9], and Brazilian-Portuguese [10] to be used in research and clinical settings. For example, ABC has been used to check the reliability of balance in patients with multiple sclerosis [11], Parkinson's disease [12], cerebral infarction [9] and those with unilateral and bilateral vestibular disorders [8].

ABC scale has only 16 questions, and the required time to be completed is 5 to 10 minutes. Hence, the scale is able to provide useful information in context of the elderly balance in a short time. ABC scale has advantages over other questionnaires that evaluate balance confidence or fear of falling that are including broader and more detailed set of activities. Therefore, it reduces the possibility of different personal interpretations of data which would be more helpful in selection of an appropriate rehabilitation method. On the other hand, since the ABC include activities with different levels of difficulty; its ability to differentiate between elderly with high and low levels of mobility is more than the similar scales [2]. Since the psychometry of ABC-P, the Persian version of the scale, for Persian-speaking elderly has not been performed yet, the aim of this study was to translate, culturally adapt and ascertain the validity and reliability of ABC-P. This version can be used to assess balance and fear of falling during daily activities in Persian-speaking elderly, and collect useful information about relative high-risk situations.

On the other hand, the obtained information will help to select appropriate methods of balance rehabilitation and monitoring by the therapists.

Methods

ABC scale consists of 16 questions and has no subscales. In this test the elderly will be asked to rate the confidence to their balance while performing an activity that has 16 different levels of difficulty based on the scale from zero to 100. The mean scores will be considered as the final score. Zero point is as the lowest score (the lowest level of confidence to balance and the highest fear of falling) and score of 100 is as the highest score (the highest level of confidence and the lowest balance of fear of falling). According to the study of Meyer et al. points resulting from ABC scale are placed in three groups; scores above 80 indicate a high potential in terms of physical function, scores between 50 and 80 indicate the average ability of physical performance and scores below 50 indicate poor physical function [13]. Lojoie et al. in their study reported that scores below 67 on the ABC scale can be a criterion for prediction of falls [14]. After seeking permission from the original ABC scale developers, we performed this cross-sectional study into two main phases. The first phase was translation and cultural adaptation and the second was to evaluate the psychometric properties.

Translation and cultural adaptation were carried out according to the protocol of international quality of life assessment (IQOLA) [15]. For this purpose, two fluent translators unfamiliar with the questionnaire independently translated the original version of ABC scale from English to Persian. Then they were asked at a meeting of researchers to grade to the difficulty of translation based on a 100-point scale (the point 0 referred to a completely simple translation and the point 100 a completely hard translation). Scores below 30 were considered as a simple translation of the Persian translation and agreed to be considered as easy.

The resulting version was presented to two other translators who independently rated the quality

of Persian translation (in the sense of clarity in terms of non-professional translation of words and adapt the content of the original version) on a scale of zero to 100 (zero poor quality and 100 high quality). Average rating was three and four points above criteria 90. Therefore, final translation was given to two other fluent translators who back-translated the scale to English. English translation obtained of this stage accompanied with the Persian translation and the original version, were presented to 12 experts in the field of balance (nine audiologists, two occupational therapists and one physiotherapist) who were asked to rate quality of the translation and cultural adaptation of all parts of final Persian translation on a scale from zero to 100 points. Questions or parts of them in terms of quality of translation and cultural adaptation with score less than 90, were discussed at the meeting and necessary modifications were made on them. The Persian translation was assessed in terms of full compliance with the cultural conditions of the elderly Persian language, and its semantic equivalence, conceptual and used technical terms were confirmed by the experts.

To assess face validity the Persian version of ABC (ABC-P) scale was administered to 10 elderly who were representative of the study population. They were asked to read each of the questions and express their understandings of the questions and their guidelines.

According to the minimum cases required in this type of study that was 100 ones [16], 142 participants aged 60 to 92 years old were chosen from Omid Cultural Center and Retirement Centers using convenience sampling. Inclusion criteria for this study include Persian speaking, living in Tehran, not having any cognitive problems (>21 in mini mental status examination) and the ability to perform daily activities inside and outside the home without assistance by a cane or walker. Since the elderly should complete the ABC-P (Appendix 1) by themselves, the literacy was also considered as inclusion criteria. Exclusion criteria included lack of desire to keep taking part and make a significant change in the state of balance in the

elderly. The study participants were aware of the study aims and upon informed consent they were ensured of securing confidentiality of their personal information. Other data were collected through interviews. Of 142 participants, 65 returned the questionnaire within a week. Scores of each question of ABC-P and scores obtained from each time of assessment were used to perform test-retest measure internal consistency. Normal distribution of data in different groups of the sample was assessed by Kolmogorov-Smirnov test. The ABC-P mean scores of different groups of samples were analyzed using t-test. The statistical differences of scores from ABC-P scale in four educational categories were evaluated using ANOVA and Tukey tests. Spearman's correlation test was used to assess correlation between scale scores and individual response to 4-choice question: "Are you afraid of falling?" Cronbach's alpha coefficient was calculated to obtain the internal consistency of the scale for each question and ABC-P total score. Data were analyzed using SPSS 20.

Results

One hundred and forty two elderly aged 60 to 92, (mean=67.746, SD=0.61) participated in this study. Mean scores of ABC-P scale was obtained in the range of 10.63 to 100, mean=75.32, SD=19.79. The highest score was for Question 1 (walk around the house) and the lowest score was for question 16 (walk on a wet or slippery surface).

Seventy four percent of participants were male and 68 were female. Other characteristics of the subjects are shown in Table 1.

Mean scores of ABC-P in males was significantly higher than that of females ($p<0.001$), and in the elderly over 75 years it significantly was lower than that of elderly lower than 75 years of age ($p=0.007$). The mean scores of ABC-P in elderly people who in their daily active ties used auxiliary devices (such as a cane, walker or help other people) was significantly lower than the seniors who rely on themselves in daily activities ($p<0.001$). The mean scores for history of falls in older people during the past year was significantly lower than

seniors who have not had such an experience ($p=0.002$). Mean scores of ABC-P of the elderly who lived alone at home with their families was below the seniors who lived with their relations ($p>0.05$), but this difference was not significant. Mean scores of ABC-P decreased with increasing levels of education. The effect of education on ABC-P scale scores was significant ($p<0.001$). The significance of scores was determined by Tukey test. The mean scores were significantly lower for the elderly with primary school education than elderly with 12 grade and higher ($p<0.05$). The mean scores for the elderly who had higher 12 grade was significantly higher than elderly with 9 grade ($p<0.05$).

The relation between fear of falling and balance was significant among the elderly ($p<0.001$). There was no significant difference between the older people who did not fear of falling with those who were afraid of falling a little and the elderly who were afraid of falling relatively with those who were afraid of falling a lot ($p>0.05$). There were also significant difference in two by two comparison of scores at other levels of fear of falling ($p<0.05$). The ABC scale has the ability to indirectly assess fear of falling in older people based on the correlation coefficient equal to -0.505. Accordingly, there was a significant relationship between the scores of ABC-P scale and the fear of falling ($p>0.05$). This finding indicated that the content of ABC-P scale (indirectly) is also able to assess fear of falling as well. Items from ABC-P scale with mean translation quality lower than 90 (according to experts' ideas) were modified. In terms of cultural adaptation, questions 3, 10 and 16 with respect to the mean of scores had little coordination with cultural conditions of the Persian speaking elderly, and thus were modified as shown in Table 2. Question 3 was changed from "bend over and pick up slippers from the front of closet floor" to "bend over and pick up slippers from the floor". Question 10 referred to a situation in which the individual passes among the cars parked in a store parking. According to experts', many stores in Iran do not have parking yet. Therefore this question

Table 1. Demographic characteristics of the participants

		No. of samples	Percent
Sex	male	74	52.1
	female	68	47.9
Education level	Elementary	39	27.5
	9 grade	26	18.3
	12 grade	33	23.2
	>12	44	31
use of walking aid	No	123	86.6
	Yes	19	13.4
Life style	Alone at home	22	15.5
	With family	120	84.5
Falling history	No	102	71.8
	Yes	40	28.2
Fear of falling	No fear	44	31
	A bit fear	49	34.5
	Rather fear	31	21.8
	Fear very much	18	12.7

was changed to "walk in a public parking". Question 16 referred to walking on icy sidewalk in accordance with Canada's climate. In Iran there would be less probability of being in a position that the elderly is forced to walk on icy grounds. Instead, the phrase "walk on wet or slippery surface" was used. At the end of panel expert, questions 2, 9, 11, 14 and 15 which includes two-part activities (such as walk up or down stairs, get into or out of a car, walk up or down a ramp, step onto or off an escalator) are divided into two parts A and B. Given that, some elderly may consider separate scores for each part of a two-part activities. This change is intended to facilitate understanding of aging and comfort in calculating scores by professionals, was done (according to scoring guidelines, lowest scores should be used in calculations

because it limits the total activity).

According to the results of face validity, understanding of content of questions and the situation in which everyone should draw, adapted with the aim of original version. Only some of the elderly had difficulty in understanding the guideline of scale, so changes in appearance of it was applied. That is firstly, the phrase "How sure you do not lose your balance, when "were repeated at the beginning of all the questions, because although some elderly were first noted that should answer to their balance confidence during the questioned activities, but forgetting their desired task. Secondly, initial expression and guide of participants which had repetitive phrases and repeated explanations, was modified more briefly without changing the content.

Table 2. Original and modified items in cultural adaptation scale of activities-specific balance confidence

No. of item	original items of the ABC scale	Modified items of the ABC-P scale
3	bend over and pick up slippers from the front of a closet floor	bend over and pick up slippers from the floor
10	walk across a parking to the mall	walk in a public parking
16	Walk outside on icy sidewalks	walk on wet or slippery surface

ABC-P scale reliability was assessed by calculating the internal consistency and test-retest reliability. Strong question-scale correlation was found among all 16 questions (Table 3). Cronbach's alpha coefficient for ABC-P total score was 0.96.

Intra-class correlation coefficient (ICC) was used to assess the correlation between the scores of the participants, during the second round of evaluation within a week was 0.97 (with confidence interval of 0.95, with 0.98 upper limit and 0.95 lower limit).

Discussion

The purpose of this study was implementation the process of translation and cultural adaptation of ABC in the Persian speaking elderly and assessment validity and reliability of it. Following the translation of ABC based on IQOLA protocol, the final Persian translation was given to experts in the field of balance and in a meeting, the quality of translation and the cultural adaptation were discussed. This part of the adaptation process is important because the final Persian version of ABC that had a good quality from the translator perspective, placed at the disposal of experts in the field of balance and the quality of the translation and cultural adaptation checked from their perspective.

In this study, the content of the questions 3, 10 and 16 were changed due to cultural issues. Question 3 was changed from "bend over and pick up slippers from the front of a closet floor" to "bend over and pick up slippers from the floor" with the argument that picking up slippers from a closet is not a common activity among the Iranian elderly. Mak et al. in their study aimed to develop a Chinese version of the ABC

scale, changed Question 3 in the same manner as in the culture of Hong Kong's slippers is used outdoors [7]. In the study of Marques et al. for the preparation of the Brazilian Portuguese version of ABC, Question 3 was also modified, so that it could be applied to similar situations [10]. In Iran many stores in shopping centers have not parking space, hence Question 10 was modified to "walking in a public parking". Marques et al. in their study did not change question 10, but due to economic conditions of the Brazilian society, they modified questions 12 and 13 and replaced the word "mall" to "bustling atmosphere", with the argument that all people in Brazil have no buying power. They also modified Question 8 from "walk outside the house to a car parked in the driveway" to "bus parked in front of the house", because, in their view, many of the Brazilian people have not private car [10]. Mak et al. in their study instead of the word "car" in questions 8 and 9 used "public transportation by" because people of Hong Kong have used public transportation more than private car [7]. In Question 16 that refer to "walk outside on icy sidewalks" that consistent with climatic conditions of Canada. In two mentioned studies and the present study, this question has changed to "walk on wet and slippery surface"

In this study to assess the face validity, 10 elderly as representatives of the target population were asked about the clarity, simplicity and ambiguity of the ABC-P questions and guidelines. However, they reported that understanding the basic guide was difficult to some of them. the guide of participants in order to understand more easily for the elderly was corrected without changing

Table 3. Internal consistency of Persian version of activities-specific balance confidence

question	Correlation coefficient of scale question	alpha coefficient in omitting a question
1	0.821	0.959
2	0.850	0.957
3	0.829	0.958
4	0.722	0.959
5	0.864	0.957
6	0.763	0.959
7	0.793	0.958
8	0.778	0.959
9	0.806	0.958
10	0.791	0.958
11	0.848	0.957
12	0.804	0.958
13	0.794	0.958
14	0.674	0.961
15	0.676	0.961
16	0.678	0.960

the content, and the phrase "How confident are you that you will not lose your balance or become unsteady when you" at the beginning of all the questions were repeated since elderly do not forget that what should be rated. In The study of Jarlsater and Mattsson with the aim of providing the Swedish version of the ABC on unilateral vestibular disorders have been conducted, to assess the face validity, in addition to assess intelligibility of questions, the patient were asked whether content of the questions scale covers all of their balance problems. Some of them said that it is better to questions about activities that need to move their head, walking in open environments and long trips in the car also be asked [8]. This is the difference between study groups in their study, in contrast to our study is justified.

Scale reliability has been one of the most

important features of a tool to be applicable in research and clinical settings. The scores obtained from the scale in terms of reliability must have two characteristics. First, the rates that are subject to the same phenomenon, or concept, must be constant or have small error, Second in multi-questions scales like present scale, changes in test scores must be coordinator [15]. In this study ABC-P scores of these two aspects have been studied. Reliability of ABC-P was evaluated by internal consistency of the scale and Cronbach's alpha coefficients. Cronbach's alpha value for each of the questions was in the range of 0.67 to 0.86 and 0.96 for the entire scale. This correlation between the questions and the total scale, means that no inappropriate questions, that reduces the overall Cronbach's alpha coefficients and internal consistency were exist, and participants'

perceptions of the scale are the same [15]. In the original version of the ABC scale Cronbach's alpha coefficient was 0.96 [2]. This is another confirmation of the equivalence scale ABC-P with the original version. Cronbach's alpha coefficient of ABC in other languages and populations is consistent with our study. For example, the Cronbach's alpha for the Chinese version of ABC was 0.97 [7], for the Korean version 0.99 [6], the Swedish version in elderly patients with cerebral infarction 0.95 [11], for 5-question scale version of ABC (ABC-5) in patients with Parkinson's disease 0.93 [12], and for the Canadian French version in elderly patients with cerebral infarction 0.93 [9].

The ICC for the results of 56 elderly that completed the ABC-P two times a week, was 0.97 that indicates a high correlation between the results of two sets of evaluation. The ICC for the original version has been 0.92 [2]. Therefore, there is no measurement error in the ABC-P or at a small scale [15].

ICC for the Chinese version of ABC is 0.99 [7], for the Korean version 0.70 [6] for the Swedish version in elderly patients with cerebral infarction 0.83 [11], the 5-question scale version of ABC (ABC-5) in patients with Parkinson's disease more than 0.91 [12] and for the Brazilian Portuguese version of ABC 0.94 [10]. However, the ICC values in different studies depending on the type and version of the study group are different. The results of several studies suggest that the ABC scale has good psychometric properties in different languages and populations.

The mean (\pm SD) of confidence level of perceived balance in Persian-speaking elderly in present study was 75.32 (SD=19.79) and the range of 10.63 to 100. The highest score was for question 1, and lowest for questions 15 and 16, respectively. In the original version of the ABC, distribution rates and the highest and lowest points in this case have been reported as well.

Conclusion

The ABC-P scale to assess the level of confidence in the balance in the Persian speaking elderly, has good reliability and

validity, and can be used in clinical and research activities.

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Appendix 1

مقیاس اطمینان به حفظ تعادل در فعالیت‌های خاص

لطفاً سطح اطمینان به خود را برای هر یک از فعالیت‌های زیر با انتخاب عدد مناسب از میان امتیازهای زیر مشخص کنید:
(بدون اطمینان به خود) ۰٪ ۱۰٪ ۲۰٪ ۳۰٪ ۴۰٪ ۵۰٪ ۶۰٪ ۷۰٪ ۸۰٪ ۹۰٪ ۱۰۰٪ (اطمینان کامل به خود)
اگر در حال حاضر فعالیت مورد سؤال را انجام نمی‌دهید، تصور کنید چنانچه مجبور به انجام آن شوید، چقدر به تعادل خود اطمینان دارید. در صورتی که برای انجام فعالیت‌های خود معمولاً از فرد یا ابزار کمکی بهره می‌برید، نمره را بر همین اساس مشخص نمایید. لطفاً هرگونه سؤال در پاسخ‌گویی به این موارد را با پرسشگر درمیان بگذارید.

- ۱- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که در خانه راه می‌روید..... %
- ۲- الف- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که از پله‌ها بالا می‌روید..... %
ب- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که از پله‌ها پایین می‌آید..... %
- ۳- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که خم می‌شوید تا یک دمپایی را از روی زمین بردارید..... %
- ۴- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که دست خود را دراز می‌کنید تا یک قوطی کوچک را از قفسه‌ای که در سطح دیدتان است، بردارید..... %
- ۵- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که روی پنجه پاها می‌ایستید تا به شئی‌ای بالاتر از سطح سرتان برسید..... %
- ۶- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که برای رسیدن به شئی‌ای، روی صندلی می‌ایستید..... %
- ۷- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که کف اتاق را جارو می‌زنید..... %
- ۸- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که از خانه خارج می‌شوید، تا سوار ماشینی شوید که در مقابل منزلتان پارک شده است..... %
- ۹- الف- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که سوار ماشین می‌شوید..... %
ب- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که از ماشین پیاده می‌شوید..... %
- ۱۰- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که در یک پارکینگ عمومی راه می‌روید..... %
- ۱۱- الف- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که از یک سطح شیبدار بالا می‌روید..... %
ب- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که از یک سطح شیبدار پایین می‌آید..... %
- ۱۲- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که در یک بازار یا مرکز خرید شلوغ که مردم با سرعت از کنار شما رد می‌شوند، راه می‌روید..... %
- ۱۳- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که در یک بازار یا مرکز خرید راه می‌روید و کسی به شما تنه می‌زند..... %
- ۱۴- الف- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که با گرفتن نردۀ پله برقی سوار آن می‌شوید..... %
ب- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که با گرفتن نردۀ پله برقی از آن پیاده می‌شوید..... %
- ۱۵- الف- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که به دلیل آنکه دستتان پر است، بدون گرفتن نردۀ پله برقی سوار آن می‌شوید..... %
ب- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که به دلیل آنکه دستتان پر است، بدون گرفتن نردۀ پله برقی از آن پیاده می‌شوید..... %
- ۱۶- چقدر اطمینان دارید تعادل خود را از دست نمی‌دهید، زمانی که روی یک پیاده‌روی خیس یا لیز راه می‌روید..... %