

Research Paper


Psychometric Properties of Strength and Cardiovascular Endurance Items of The Persian Version of Functional Fitness Assessment Test in the Iranian Elderly




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ABSTRACT

Objectives The present research was conducted to evaluate the psychometric properties (validity and reliability) of Persian version of strength and cardiovascular endurance items of functional fitness assessment test in Iranian elderly.

Methods & Materials The statistical sample consisted of 200 elderly (100 males and 100 females) with mean aged 68.05±5.21 years old that were selected by random cluster sampling in Tehran city. The tools used included strength and cardiovascular endurance items of Functional Fitness Assessment test for adults over 60 years (FFAA). Content, structure and concurrent methods was used to evaluate validity. For evaluation of concurrent validity, the hand grip and treadmill tools were used. In order to assess the reliability, the temporal and internal consistency methods were used.

Results The results showed that the content validity of strength and cardiovascular endurance items were confirmed (90%-95%). Results of construct validity showed that the Pearson correlation coefficient between age with strength and cardiovascular endurance items is meaningful significant (0.71-0.75). Results of Pearson correlation coefficient test showed that the correlation between strength and cardiovascular endurance items and laboratory tests related to each of them were obtained for high levels (0.90-0.96). Therefore, the correlation obtained indicates the concurrent validity of this test items. Also, results showed that the test-retest interclass correlation test with a one-week interval, indicate that the temporal stability is acceptable (0.81-0.85). Furthermore, the results of Cronbach's alpha coefficient showed that the internal consistency of each item was acceptable ($\alpha > 0.75$).

Conclusion Results indicate that the strength and cardiovascular endurance items in elderly sample are valid and reliable, and the Persian version of these items can be used to assess the functional fitness among Iranian elderly people.

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Extended Abstract

1. Introduction

According to researchers, the growth of the number of individuals aged >60 years in countries, such as the United Kingdom, Portugal, as well as other European countries is 10 times higher than the growth of their population [2, 1]. Studies suggested that the physiological abilities of individuals decrease by about 10% to 15% per life decade in those aged >60 years (3-6). Accordingly, they encounter a severe reduction in the ability to perform daily living activities [2, 1]. Inventories employed to assess and improve the physical conditions of middle-aged and young groups may not address the elderly's needs [1]. Therefore, such scales lack sufficient validity and reliability for the elderly [5].

Considering the necessity to provide data related to the elderly, the American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD), attempted to develop an effective and inexpensive field tool to increase the functional capacity of the elderly [6]. To achieve this goal, the AAHPERD introduced the concept of Functional Fitness (FF). FF for the elderly is defined as the physical capacity required to independently perform daily living activities without excessive fatigue and under optimal physiological conditions [1, 6]. Osness et al. (1990) developed the Functional Fitness Assessment for adults aged over 60 years (FFAA) and re-evaluated it in 1996. The FFAA for individuals aged over 60 years has 6 items that accurately explore the components of capacity and FF in the elderly [7-9].

Considering the field nature of the inventory, individual, cultural, and group differences can affect the evaluation and the type of records obtained from each individual. Thus, according to the comprehensive consequences of the increasing elderly population, the current study aimed to investigate the reliability and validity of the Persian version of the FFAA concerning cardiovascular strength and endurance items in Iranians aged >60 years.

2. Methods & Materials

The statistical population of the present study consisted of all the elderly in the age range of 60 to 80 years in Tehran City, Iran. We employed a random cluster sampling method to select the study participants. eventually, the study sample included 200 elderly (100 men & 100 women) with an age range of 80-60 years. The instrument investigated in the present study included the items of strength and endurance of the cardiovascular system of the FFAA [8, 9]; this study examined their validity and reliability. The selected items

included strength/endurance aspects using the superior hand dumbbell test for 30 seconds, followed by cardiovascular endurance items using the 880-yard walking test.

In addition, test equipment consisted of a cone; two 1.8 kg dumbbells for older women and two 3.6 kg dumbbells for older men, and a stopwatch [9, 8]. The content validity of the cardiovascular strength and endurance items was determined by 5 experts. To evaluate the construct validity of the test, the scale development changes method was used. This method is used for tests in which the property being measured is age-related. Accordingly, if a test has desirable construct validity, a significant correlation can be obtained between different age groups [6, 12]. To determine the concurrent validity of cardiovascular strength and endurance items, a set of laboratory tests was employed; the purpose of each was per the Objectives of each item of the FFAA [8, 9]. Accordingly, a manual tachometer was used to assess the strength of the hand muscles; a treadmill was applied to measure cardiovascular endurance [13, 14]. Fifty elderly (n=25/gender) were evaluated at this stage.

The reliability of the test was explored using test-retest and internal consistency methods. Therefore, 50 elderly (n=25/gender) were evaluated to determine the internal consistency with a one-week interval. Cronbach's alpha coefficient was used to determine the internal consistency of cardiovascular strength and endurance items.

3. Results

The content validity of the test was determined by 5 experts (at least assistant professors) in the fields of occupational therapy, physiotherapy, and exercise science, and sports physiology. The evaluation analysis results indicated that the content validity of cardiovascular strength and endurance items was approved to be high and acceptable (90% to 95%). Therefore, according to the experts, the Persian version of the test provided acceptable content validity in terms of measuring the quality of 2 functional skills in the elderly.

Construct validity is employed for evaluating the developmental changes of tests where properties are measured by the development-related problems. Therefore, the correlation between the age of the elderly and the items of strength and cardiovascular endurance was separately calculated for men and women using the Pearson correlation coefficient.

The related results suggested a significant correlation between age and strength and cardiovascular endurance items for all subjects, men, and women, respectively. A set of

laboratory tests was performed to determine the concurrent validity of the FFAA.

The obtained data demonstrated a significant correlation between strength and cardiovascular endurance items of the FFAA and laboratory test related to each of them, for all subjects, men, and women, respectively ($P < 0.05$). The Kappa coefficient was used to assess the reliability between the evaluators. The related results indicated a reliability of 0.86(86%) between the assessors. The achieved data reflected the reliability between the evaluators at a high (excellent) level.

To run the test-retest method for determining the reliability, 50 elderly were evaluated at one-week intervals. Cronbach's alpha coefficient was applied to explore the reliability of the test by the internal consistency method. The values of correlation coefficients within the items obtained from the test-retest items were higher than that of the acceptable value (0.75) for the values of all investigated items.

This finding indicates the acceptable reproducibility of cardiovascular strength and endurance items. The Cronbach's alpha coefficient results suggested that the internal consistency (Cronbach's alpha coefficient) of each item was acceptable ($\alpha > 0.75$).

4. Conclusion

The present study aimed to evaluate the reliability and validity of the cardiovascular strength and endurance items of the Persian version of the FFAA in the Iranian elderly. The relevant results revealed that the content, structure, and concurrent validity of cardiovascular strength and endurance items were significant for the whole sample and both genders.

Therefore, the obtained data highlighted that the items of strength and cardiovascular endurance of the Persian version of the FFAA can be used to assess FF among the Iranian elderly. The results of the correlation coefficient test to determine the reliability indicated that the values of correlation coefficients of each item fell in the desired and acceptable ranges.

In general, the present study findings suggested that cardiovascular strength and endurance items have a desirable validity (content, structure, & concurrent) and reliability (test-retest & internal consistency) in the Iranian elderly. As a result, the Persian version of the cardiovascular strength and endurance items of the FFAA can be used as a valid and reliable tool for evaluating FF among the Iranian elderly. These items, along with other tools for measuring the

biopsychological components of the elderly, also provide a desirable platform for researchers and health professionals for further research and practical activities.

Ethical Considerations

Compliance with ethical guidelines

All ethical principles are considered in this article. The participants were informed about the purpose of the research and its implementation stages. The Research Committee at the University of Social Welfare and Rehabilitation Sciences approved the study.

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Authors' contributions

Conceptualization: Fatemeh Shoaee, Robab Sahaf, Amir Shams; Methodology: Robab Sahaf, Amir Shams, Parvaneh Shamsipour Dehkordi; Validation: Fatemeh Shoaee, Robab Sahaf, Amir Shams, Parvaneh Shamsipour Dehkordi; Formal analysis: Amir Shams, Mohammad Shurideh; Investigation: Shoaee, Amir Shams; Writing – review & editing: Amir Shams, Robab sahaf; Visualization, Supervision, Project Administration: Fatemeh Shoaee, Amir Shams; Funding acquisition, Resources: Fatemeh Shoaee, Mohammad Shurideh

Conflicts of interest

The authors declared no conflict of interest.