

The psychometric properties of exercise benefits/barriers scale among women

Leila Amiri Farahani¹, Soroor Parvizy², Eesa Mohammadi³, Mohsen Asadi-Lari⁴, Anoshiravan Kazemnejad⁵,
Seyede Batool Hasanpoor-Azghady¹, Ziba Taghizadeh⁶

¹ PhD of Reproductive Health, Assistant Professor, Department of Midwifery, Faculty of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran

² PhD of Nursing, Professor, Department of Pediatric Nursing, Faculty of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran

³ PhD of Nursing, Professor, Department of Nursing, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

⁴ MD PhD of Epidemiology, FRIPH, Professor, Oncopathology Research Centre, Department of Epidemiology, School of Public Health, Iran University of Medical Sciences, Tehran, Iran

⁵ PhD of Biostatistics, Professor, Department of Biostatistics, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

⁶ PhD of Reproductive Health, Assistant Professor, Faculty Member of Nursing and Midwifery Care Research Center, Nursing and Midwifery School, Tehran University of Medical Sciences, Tehran, Iran

Type of article: Original

Abstract

Background and objective: Despite the numerous health benefits of regular physical activity (PA), physical inactivity is a major health issue among women. The goal of the current study was to measure the validity and reliability assessment of the exercise benefits/barriers scale among women between the ages of 18 and 65 years. This study was carried out among women residing in Khoramroudi neighborhood in Tehran between December 2013 and February 2014.

Methods: In this descriptive, methodological study, 278 women residing in Khoramroudi neighborhood in Tehran between December 2013 and February 2014 completed three questionnaires: the demographic data form, the Exercise Benefits/Barriers Scale. The construct validity, internal consistency, and stability of the study were measured by confirmatory factor analyses, Cronbach's alpha, and Spearman Brown correlation coefficient by using SPSS 21 and LISREL 8.80, respectively.

Results: The confirmatory factor analysis showed the Persian version of EBBS was structured well. The Cronbach's alpha coefficients for the total scale and its subscales were 0.927, 0.94 and 0.82, respectively. Spearman Brown correlation coefficient also showed good test-retest reliability.

Conclusion: The results of this study verified the reliability and validity of the applied instrument and introduced it as a tool to measure the benefits and barriers of physical activity among Iranian women.

Keywords: Physical Activity; Exercise; Benefits; Barriers

1. Introduction

Lack of physical activity (PA) is a main preventable cause of death across the world (1). It is a risk factor which contributes in many common chronic health issues such as obesity, heart stroke, type 2 diabetes, and cardiovascular diseases (2). The detriments of physical inactivity have been the subject of several studies and been well documented in many articles (3, 4). The report of the urban health equity assessment and response tool (Urban HEART) project (2011) says that 20.5% of women and 24.3% of Iranian men exercise less than the time

Corresponding author:

Assistant Professor Dr. Ziba Taghizadeh, Faculty Member of Nursing and Midwifery Care Research Center, Nursing and Midwifery School, Tehran University of Medical Sciences, Tehran, Iran.

Tel: +98.2166941669, Fax: +98.2166941669, Email: Zibataghizadeh@yahoo.com

Received: December 19, 2016, Accepted: March 14, 2017, Published: July 2017

iThenticate screening: February 26, 2017, English editing: May 20, 2017, Quality control: June 02, 2017

© 2017 The Authors. This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

recommended by the guideline of PA (unpublished data). Therefore, the minimum PA per week is 150 minutes of moderate intensity exercise or 75 minutes of vigorous intensity exercise (5). Involvement in PA is directly linked to participants' perception of exercise benefits, motivation and barriers preventing PA (5). The perception of PA benefits is comprised of reinforcement, facilitation, nurturing and enabling the adoption and adherence of such a behavior. With regard to the intrinsic benefits of PA, it can be health promotion, self-confidence, and well-being or can be extrinsic such as promotion of social interaction, attendance in a comfortable environment, and reception of financial rewards (6). Overall, people with a better perception of PA benefits are more likely to exercise than others (7). The perception of PA barriers consists of real or imaginary obstacles, inconveniences, difficulties and expenses that may negatively influence activity levels (7). In the case of women, barriers to their PA engagement are often related to child-care responsibility, financial inability and security concerns (8, 9). Identifying the barriers to and having an adequate understanding of the advantages of PA lead to a physically active lifestyle. Nevertheless, it is unlikely that any lifestyle changes happen without proper understanding of the benefits and barriers of PA (10). Therefore, there is a need for a reliable and valid tool that can identify and measure perceived benefits and barriers of PA for the target population. A lack of a culture-based instrument encourages others to use tools developed in other cultures, if they follow the standard methods of the trans-cultural adaptation (11). Among published international studies, the Exercise Benefits/Barriers Scale (EBBS) designed by Sechrist et al. have acceptable validity and reliability. Cronbach's alpha coefficients for the total scale, benefits and barriers subscales were 0.952, 0.953 and 0.866, respectively (12). Among the studies conducted in Iran, Aghamolaei et al. measured the reliability of the total scale using Cronbach's alpha coefficients among university students ($\alpha = 0.87$), but the researchers did not carry out any other psychometric properties of EBBS such as factor analyses (13). Akbari Kamrani et al. reported psychometric characteristics of EBBS in an elderly population in Iran (14). Given the PA level, perceived benefits and barriers differ between age groups (15); therefore, it is necessary to measure benefits and barriers among women using a standardized instrument. The presented study was conducted with the aim of assessing the psychometric characteristics of an Iranian version of EBBS among women between the ages of 18 and 65 years. It is important to mention that this article is a larger project on improving PA in Women using a mixed-method action research in Iran. The aim of this project is to design, implement and evaluate a program with the consideration of culture and context for the promotion of PA in Iranian women.

2. Material and Methods

2.1. Study design

This research was conducted as a methodological cross-sectional study which utilized the psychometric properties and cultural adaptation process of EBBS developed by Sechrist et al. (12).

2.2. Setting and sample

The target population was composed of women between the ages of 18 and 65 years. The convenience sample was composed of 300 women residing in Khoramroudi neighborhood in the second municipal district of Tehran between December 2013 and February 2014. The sample size of the current study is 300 people, regarding the studies, they were conducted on PA at Urban HEART project (unpublished data) with P (prevalence of sufficient PA) =23%, $d=0.05\%$, and considering $\alpha=0.05$ and $\beta=1.96$. According to the second report (2011) of Urban HEART project in Tehran, every neighborhood of 22 municipal districts of Tehran was divided into several blocks. We used available information about the blocks located in Khoramroudi neighborhood. Khoramroudi neighborhood has numerous blocks; however, we only selected some blocks using a systematic sampling method in which only 18-65 years old women were interviewed in the neighborhood households. If a woman declined to take part, another woman was invited to take part in the project and filled out the questionnaire. The participants of the study were chosen under the criteria of being female between the ages of 18 and 65 years, able to read Persian, capable of engaging in PA, and in verbal consent to contribute in the study. The criteria for excluding participants from the study were acute physical or psychological discomfort and pregnancy.

2.3. Ethical consideration

The permission to use the original EBBS was obtained from its author. The Institutional Review Board of the Tehran University of Medical Sciences (IRB approval number: 92-02-28-23311) approved the research project. The aim of this study was stated to the participants. Also, they were assured of the information confidentiality. They also verbally expressed their consent of participation in the study.

2.4. Measurements/Instruments

The following socio-demographic variables were collected: age, education, marital status, occupation, income, and living status, as well as the following anthropometric indexes: weight, height, and Body Mass Index (BMI). The original version of EBBS consisted of 43 items, 29 items under the construct of benefits, and 14 items under the construct of barriers. The benefit scales are composed of 5 subscales: life enhancement, physical performance, psychological outlook, social interaction, and preventative health. The barrier scales are composed of 4 subscales: exercise milieu, time expenditure, physical exertion and family discouragement. The scales are designed based on a 4-point Likert scale: strongly agree (4), agree (3), disagree (2), strongly disagree (1). When the barriers and benefits are added together for a total benefits/barriers score, the items of the barrier scale have an inversed score. The barrier items are not inversed scored if only the barrier items are used. The benefit subscales can have a score ranging from 29 to 116 and the barrier subscales can have a score ranging from 14 to 56. Altogether, they result in a total score between 43 and 172. In this scoring system, the higher score represents greater perception of a subscale (12).

2.5. Data collection/Procedure

In this research, the Persian translation of EBBS was performed in a forward-backward translation procedure. The tool was translated by two people having enough experience with English text and familiarity with health and medical terms. Afterwards, two expert translators translated the tool back into American English. After backward translation, the researchers and translators compared the English backward translation and the original version and carried out the revisions. After a careful review and cultural adaptation, few changes were made and the provisional version of the questionnaire was provided. Later twenty female participants completed the questionnaire, and accordingly the sentences and phrases that were incomprehensible for participants were edited by researchers. In addition, an expert panel of fourteen specialists of health promotion, health education, nursing and midwifery, PA and sport science, as well as reproductive health was asked to qualitatively assess EBBS for face validity. This resulted in the revision of many items of the questionnaire. The same experts also assessed EBBS qualitatively for the content validity.

2.6. Data analysis

The IBM© SPSS© Statistics version 21 (IBM© Corp., Armonk, NY, USA) and LISREL 8.80 (Scientific Software International Inc., 2007) were used for statistical analysis. $P < 0.05$ was considered statistically significant. Reliability of EBBS was measured using internal consistency and stability. The internal consistency was estimated using Cronbach's alpha for the total scale, benefits and barriers subscales. Values greater than or equal to 0.70 were considered as acceptable. Using the test-retest approach, the stability of EBBS was measured by employing the Spearman Brown coefficient over a random sample of women. Thirty participants filled out EBBS twice within two weeks. The Spearman coefficient greater than or equal to 0.70 was considered as a satisfactory result (16). Validity was evaluated through a combination of content validity, construct validity with CFA. The CFA was performed using the weighted least squares estimation for assessing how well the models were fit to observed data. Asymptomatic covariance matrix was used as a weighted matrix, and the input matrix was considered the covariance matrix of data (17, 18-20). $\chi^2 / df < 5$, Root Mean Square Error of Approximation (RMSEA) < 0.08 and Standardized Root Mean Square Residual (SRMR) < 0.1 and also, Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI) Normed Fit Index (NFI), Non-Normed Fit Index (NNFI) > 0.90 were used for the data analysis as fit indices and their acceptable values (18).

3. Results

3.1. Participant characteristics

Out of 300 study cases, 278 returned the questionnaire which resulted in a response rate of 92.67%. The EBBS guideline recommends that the response should be discarded if more than 5% of the items are not answered. The guideline also recommends using the median when the rate of missing items is less than 5% (12). Seventeen questionnaires had more than 5% missing items; therefore, they were excluded from the study and the analyses were done based on 261 questionnaires. The average age of the study participants was 41.7 years. 44 % of the participants had a high school degree; 72.8% of them were married and 57.4% of them lived with their spouses and children. 37% of the participants were overweight while 22.2% of them were obese (Table 1).

3.2. Reliability

Cronbach's alpha reliability coefficients for each part of the instrument were calculated for the measurement of internal consistency. The Cronbach's alpha coefficients for the total scale, the subscales of benefits and barriers were 0.927, 0.94 and 0.82, respectively. The value of the test-retest of EBBS calculated by Spearman Brown

coefficient was 0.76 ($p=0.004$), 0.79 ($p=0.046$) and 0.74 ($p=0.008$) for the total scale, benefits and barriers subscales, respectively.

3.3. Validity

The validity of scale was done on the basis of qualitative face and content validity. This indicates that the questionnaire was translated competently. CFA was used to evaluate the model designed on the basis of original scale. It was seen that the model had reasonably good fit indices as shown in Table 2. Based on this model, standardized factor loadings ranged from 0.30 to 0.97 in EBBS, with all items demonstrating moderate to strong factor loadings (above 0.30). This revealed that the Persian version of EBBS was structured well.

Table 1. The demographic characteristics of the samples

Characteristics		
Age (year), mean (SD)		41.70 (12.01)
BMI (kg/M ²), mean (SD)		26.06 (4.54)
Educational level; n (%)	Primary school	5 (1.9)
	Secondary school	11 (4.2)
	High school and diploma	115 (44.0)
	¹ BS	96 (36.7)
	² MS and higher	25 (9.5)
	Other	9 (3.4)
Occupation; n (%)	Housewife	149 (57.0)
	Unemployed	82 (31.4)
	Employed	30 (11.5)
Marital status; n (%)	Single	53 (20.3)
	Married	190 (72.8)
	Widowed	12 (4.5)
	Separated/divorced	6 (2.2)
Living status; n (%)	Alone	5 (1.9)
	Parents	44 (16.8)
	Only with father or only with mother	9 (3.4)
	Spouse and children	150 (57.4)
	Only with children	18 (6.7)
	Spouse	30 (11.5)
	Other	5 (1.9)

1) Bachelor of Science, 2) Master of Science

Table 2. Result of fit index CFA of EBBS

X ²	df	X ² /df	SRMR	RMSEA	CFI	NFI	NNFI	GFI	AGFI
1735.91	824	2.12	0.06	0.06	0.96	0.95	0.95	0.94	0.90

All item scale relationships were statistically significant ($P<0.005$).

4. Discussion

This research evaluates the psychometric properties of EBBS in a population of females between the ages of 18 and 65 years. It was a study conducted in Iran for investigating the psychometric properties of EBBS over the women population between the ages of 18 and 65 years. For simplicity, fluency and compliance with cultural and social norms, the contents of the questionnaire were frequently modified during the process of translation and the face and content validity assessment; however, the number of items was kept unchanged as 29 benefits items and 14 barriers items along with 9 factors which were entered in the validation process. The results show that EBBS can be used as a reliable and valid tool for evaluating the benefits and barriers of PA among Iranian women. The other studies conducted in elderly populations in Brazil and Iran also approved the validity and reliability of EBBS (6, 14). Construct validity of EBBS for women was determined through factor analysis. According to the results, the best fit for this set of data is a 9-factor solution. CFA was employed to confirm the results of original study, which supported the initial construct validity of the Iranian version of EBBS in women. The results of the presented study were different than the research done by Akbari Kamrani et al. as they predicted 41 items in 10 components (14). Although three factors measured in the presented study were exactly consistent with their results. Similarly, Brown

identified 26 items in 7 factors (21). Three factors reported in this study were inconsistent with those reported by the Brown's study. Cronbach's alpha coefficient which shows reliability, was in an acceptable range, higher than 0.7 for all items and showed strong internal consistency for the total scale, benefits and barriers subscales. This level of satisfaction in internal consistency is almost similar to the original version of EBBS and majority of the translated versions (6, 12, 14). In the study of Victor et al., the reliability values, which were measured by Cronbach's alpha, were 0.94, 0.93 and 0.87 for the total scale, benefits and barriers subscales, respectively (6) while they were 0.83, 0.94 and 0.68 in the research presented by Akbari Kamrani et al. (14). It is important to mention that an item should have a minimum value of 0.70 for being able to measure the same construct. In the behavioral analysis of each item with regard to its contribution to the internal consistency of the instrument, a minimal variation of the alpha values was reported. This shows that the translated version is congruent or complementary in terms of each individual item (22). The analysis of EBBS stability by Spearman Brown coefficient showed acceptable values. These values are 0.76, 0.79 and 0.74 for the total scale, benefits and barriers subscales, respectively. However, the values are lower than the original scale, 0.889, 0.893 and 0.772 which were calculated based on the 43-item instrument including 29 benefits scales and the 14 barriers scales (12). Brown's study was done on students between the ages of 18 and 35 years. The majority of students were single and white and more than 50% of them had adequate PA. Akbari Kamrani et al. did their study on elderly people with an age higher than 60 years old. In their study, the majority of people were male and the samples were collected from a different area of Tehran. The proposed study was conducted on females between the ages of 18 and 65 years. Most of them were married and housewives and all lived in the same neighborhood in Tehran. The majority of them had a similar socio-economic status and lack of PA. As demographic characteristics and level of PA can vary in other studies, it is expected the perceived benefits and barriers of PA to be different among their participants compared to the proposed study.

5. Conclusions

This study investigated the reliability and validity of the Persian version of EBBS. The results indicated that this instrument has good psychometric properties and can be recommended as a valid tool for measuring the benefits and barriers of PA among Iranian women between the ages of 18 and 65 years. In this study, all participants were selected from the same neighborhood in Tehran. This suggests conducting a similar study for a population of women from different regions and cultures.

Acknowledgments:

This study was funded and supported by Tehran University of Medical Sciences (grant no. 92-02-28-23311). The authors would like to express their gratitude to the women who participated in this study and to their sincere cooperation and also to Kayla J. Power for her valuable and kind assistance with English language editing of the article.

Conflict of Interest:

There is no conflict of interest to be declared.

Authors' contributions:

All authors contributed to this project and article equally. All authors read and approved the final manuscript.

References:

- 1) Organization WH. Global health risks: mortality and burden of disease attributable to selected major risks: World Health Organization; 2009.
- 2) Dumith SC, Hallal PC, Reis RS, Kohl HW 3rd. Worldwide prevalence of physical inactivity and its association with human development index in 76 countries. *Prev Med.* 2011; 53(1-2): 24-8. doi: 10.1016/j.ypmed.2011.02.017. PMID: 21371494.
- 3) Slentz CA, Duscha BD, Johnson JL, Ketchum K, Aiken LB, Samsa GP, et al. Effects of the amount of exercise on body weight, body composition, and measures of central obesity: STRRIDE—a randomized controlled study. *Arch Intern Med.* 2004; 164(1): 31-9. doi: 10.1001/archinte.164.1.31. PMID: 14718319.
- 4) Stubbs CO, Lee AJ. The obesity epidemic: both energy intake and physical activity contribute. *Med J Aust.* 2004; 181(9): 489-91. PMID: 15516193.
- 5) Committee PAGA. Physical activity guidelines advisory committee report, 2008. Washington, DC: US Department of Health and Human Services. 2008; 2008: A1-H14.

- 6) Mokdad AH, Giles WH, Bowman BA, Mensah GA, Ford ES, Smith SM, et al. Changes in health behaviors among older Americans, 1990 to 2000. *Public Health Rep.* 2004; 119(3): 356-61. doi: 10.1016/j.phr.2004.04.015. PMID: 15158115, PMCID: PMC1497641.
- 7) Victor JF, Ximenes LB, Almeida PCd. Reliability and validity of the Exercise Benefits/Barriers scale in the elderly. *Acta Paulista de Enfermagem.* 2012; 25(SPE1): 48-53. doi: 10.1590/S0103-21002012000800008.
- 8) Northcott MC. '... So yeah, you do what you can...': Exploring the barriers to women's opportunities for physical activity: *Citeseer*; 2009. doi: 10.2105/AJPH.2004.048256. PMID: 15798125, PMCID: PMC1449236.
- 9) Berger G, Peerson A. Giving young Emirati women a voice: participatory action research on physical activity. *Health place.* 2009; 15(1): 117-24. doi: 10.1016/j.healthplace.2008.03.003. PMID: 18515171.
- 10) Caperchione CM, Kolt GS, Tennent R, Mummery WK. Physical activity behaviours of Culturally and Linguistically Diverse (CALD) women living in Australia: a qualitative study of socio-cultural influences. *BMC Public Health.* 2011; 11: 26. doi: 10.1186/1471-2458-11-26. PMID: 21223595, PMCID: PMC3091537.
- 11) Schoenfelder DP, Rubenstein LM. An exercise program to improve fall-related outcomes in elderly nursing home residents. *Appl Nurs Res.* 2004; 17(1): 21-31. PMID: 14991552.
- 12) Cruciani F, Adami F, Assunção NA, Bergamaschi DP. Conceptual, item, and semantic equivalence of a Brazilian version of the Physical Activity Checklist Interview (PACI). *Cad Saude Publica.* 2011; 27(1): 19-34. PMID: 21340101.
- 13) Sechrist KR, Walker SN, Pender NJ. Development and psychometric evaluation of the exercise benefits/barriers scale. *Res Nurs Health.* 1987; 10(6): 357-65. PMID: 3423307.
- 14) Aghamolaei T, Tavafian SS, Hassani L. Exercise Self-efficacy, Exercise Perceived Benefits and Barriers among Students in Hormozgan University of Medical Sciences. *Iranian Journal of Epidemiology.* 2009; 4(3 and 4): 9-15.
- 15) Akbari Kamrani AA, Zamani Sani SH, Fathire-Zaie Z, Bashiri M, Ahmadi E. The Psychometric Characteristics of the Exercise Benefits/Barriers Scale among Iranian Elderly. *Iran J Public Health.* 2014; 43(3): 362-6. PMID: 25988097, PMCID: PMC4419175.
- 16) Hyrkäs K, Appelqvist-Schmidlechner K, Oksa L. Validating an instrument for clinical supervision using an expert panel. *Int J Nurs Stud.* 2003; 40(6): 619-25. PMID: 12834927.
- 17) Bartlett MS. A Note on the Multiplying Factors for Various Chi Square Approximations. *Journal of the Royal Statistical Society.* 1954; 296-8.
- 18) Burns N, Grove S. *The practice of nursing research, conduct, critique, and utilization*, WB Saunders. Philadelphia, Pa. 2001.
- 19) Bentler PM, Bonett DG. Significance tests and goodness of fit in the analysis of covariance structures. *Psychological bulletin.* 1980; 88(3): 588. doi: 10.1037/0033-2909.88.3.588.
- 20) Bentler PM. Comparative fit indexes in structural models. *Psychol Bull.* 1990; 107(2): 238-46. doi: 10.1037/0033-2909.107.2.238ax. PMID: 2320703.
- 21) Cohen J. *Statistical power analysis for the behavior science.* Lawrance Erlbaum Association. 1988.
- 22) Brown SA. Measuring perceived benefits and perceived barriers for physical activity. *Am J Health Behav.* 2005; 29(2): 107-16. doi: 10.5993/AJHB.29.2.2. PMID: 15698978.