

Reliability and Validity of the Turkish Version of Baecke Habitual Physical Activity Questionnaire in Healthy Adults

Sağlıklı Yetişkinlerde Baecke Habitual Fiziksel Aktivite Anketinin Türkçe Güvenilirliğinin ve Geçerliğinin İncelenmesi

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ABSTRACT Objective: Physical activity plays an important role in maintaining health, preventing causes of disability and even death. To be able to manage physical inactivity and the associated millions of deaths per year, we need to understand the basic principles that govern physical activity. Baecke Habitual Physical Activity Questionnaire (BHPAQ) has widely been employed in clinical settings and research however, the reliability and validity of this questionnaire have not been investigated amongst the Turkish population. The purpose of this study was to examine the reliability and validity of the Turkish Version of BHPAQ in Healthy Adults. **Material and Methods:** A total of 194 healthy subjects (93 female, 101 male) were included in the study. BHPAQ was translated using a back-translation technique to Turkish. The International Physical Activity Questionnaire (IPAQ) was used for construct validity (Spearman's rho). Intra class coefficients (ICCs) were used for reliability, and Cronbach's alpha was used for internal consistency. **Results:** The statistical analysis showed that all BHPAQ sub-scores had almost perfect test-retest reliability. According to the analysis, ICC varied from 0.98 to 0.99 in all of the BHPAQ sub-scores. BHPAQ total score was found moderately related to IPAQ total score (rho: 0.47 p<0.001). **Conclusion:** The findings revealed that the Turkish version of BHPAQ and its sub-scores show excellent reproducibility and moderate construct validity.

ÖZET Amaç: Fiziksel aktivite, özürüllüğü ve hatta ölüme neden olacak faktörleri önlemek için önemlidir. Fiziksel inaktiviteye bağlı olarak her yıl meydana gelen milyonlarca ölümü önleyebilmek için fiziksel aktivitenin detaylıca ölçülmesi gerekmektedir. Baecke Habitual Fiziksel Aktivite Anketi (BHPAQ) klinik ortamda ve araştırmalarda yaygın olarak kullanılan bir anket olmasına rağmen bu anketin Türk olgularındaki güvenilirliği ve geçerliği araştırılmamıştır. Bu çalışmanın amacı, BHPAQ'nun sağlıklı yetişkinlerde Türkçe versiyonunun güvenilirliğini ve geçerliğini incelemektir. **Gereç ve Yöntemler:** Çalışmaya 194 (93 kadın, 101 erkek) sağlıklı olgu dâhil edildi. BHPAQ, çevirileri çeviri tekniği kullanılarak Türkçeye çevrildi. Yapı geçerliğinin araştırılması için Uluslararası Fiziksel Aktivite Anketi [International Physical Activity Questionnaire (IPAQ)] kullanılmıştır (Spearman's Rho). Güvenilirlik için sınıf içi korelasyon katsayısı [intra class coefficients (ICC)], iç tutarlılık için Cronbach's alfa kullanılmıştır. **Bulgular:** İstatistiksel analiz sonuçları, tüm BHPAQ alt skorlarının neredeyse mükemmel test-tekrar test güvenilirliğine sahip olduğunu göstermiştir. Analize göre, tüm BHPAQ alt skorlarında ICC; 0,98 ile 0,99 arasında değişmiştir. BHPAQ toplam puanı IPAQ toplam puanı ile orta derecede ilişkili bulunmuştur (rho=0,47, p<0,001). **Sonuç:** Bulgular, Türkçe BHPAQ ve alt puanlarının mükemmel tekrarlanabilirliği ve orta düzeyde yapı geçerliliği gösterdiğini ortaya koymuştur.

Keywords: Physical activity; healthy subjects; measurement; assessment

Anahtar Kelimeler: Fiziksel aktivite; sağlıklı bireyler; ölçüm; değerlendirme

Physical activity is important for improving musculoskeletal health and function, preventing cognitive decline, lowering depression and anxiety symptoms, and maintaining weight control.¹ When

physical activity is performed with the correct duration, and sufficient intensity, on a regular basis, it is known that essentially everyone from every age range can benefit from increasing physical activity.²

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Many international organizations (including the World Health Organization) have created guidelines for physical activity based on strong evidence. Current international guidelines generally advise moderate-vigorous physical activity with a duration of 150 minutes per week which is associated with significant health benefits including reduced risk for various chronic conditions in many systematic reviews.¹ In adults within the age range of 18-64, physical activity occurs during recreational time, occupation, household chores, gaming, sports or exercise, during transportation and in daily activities with family, friends or the community.³

Measuring physical activity levels in clinical rehabilitation, may reflect the functional status of patients indirectly. Thus the efficiency of a treatment program can be determined.⁴ Measurement of physical and functional activity is also important in epidemiological studies.⁵ Various direct and indirect measurement techniques of evaluation have been established. Some of these techniques are; monitoring activity via different devices such as an accelerometer, heart rate monitor or methods like double-labeled water.⁶⁻⁷ However, the aforementioned assessment methods are often difficult to access or expensive because they require equipment.⁷ Therefore, questionnaires are also widely used due to the fact that they are easy to apply, reliable and simple methods of assessment. Questionnaires are also convenient since they can be used when data collection is necessary from a large number of participants.⁸ In self-reported questionnaires, the assessment of physical activity is determined via the score obtained by the subjects' answers to the items in the questionnaire. The obtained scores are used to compare the subjects physical activity levels before and after a treatment.⁹ However, the validity, reliability and cross-cultural adaptation procedures must be completed prior to using a questionnaire in a different culture or country and for people speaking a different language.⁹⁻¹⁰

To date, there are several different self-reported questionnaires for assessment of physical activity. The Baecke Habitual Physical Activity Questionnaire (BHPAQ) is a self-reported questionnaire which can be used in different groups with the aim of assessing physical activity levels.¹¹

When compared to other self-reporting questionnaires, BHPAQ has advantages; a broad range of physical activities which are performed during occupation, sports, and recreational activities are included in assessment. Furthermore, BHPAQ assesses the individuals' level of physical activity over the last year compared to other questionnaires which assess activity over a short period of time.¹¹ BHPAQ is a simple questionnaire that is easy to self-administer. BHPAQ was validated in different languages such as Chinese, Brazilian-Portuguese, and Persian and for many medical conditions including low back pain, hip disorders, and HIV-AIDS.¹²⁻¹⁷ However, according to our knowledge no validation is available for BHPAQ in Turkish language. Therefore, the aim of the present study was to investigate the validity and reliability of BHPAQ in Turkish population.

MATERIAL AND METHODS

The necessary permissions were obtained from Jan Burema and the required approvals were obtained from Gazi University Ethics Commission (77082166-604.01.02, study no: 2018-439, approval date 11.12.2018) prior to study. The authors conformed to the ethical guidelines of the 1975 Declaration of Helsinki. All participants signed an informed consent form stating they were willing to participate in the study.

TRANSLATION PROCESS

Forward and back translation of the BHPAQ was carried out in line with the guidelines by Beaton et al.¹⁰ The original English version of the questionnaire was translated to Turkish by two bilingual translators independently. One of the translators was a physiotherapist and the other had no medical or clinical background. When a consensus was reached, a single form was generated from the two translations. The first Turkish version of the questionnaire was translated to English back and the originality was compared by two people whose native language was English and who can also speak Turkish well. Then the final Turkish form was consolidated by a team consisting of translators and researchers. In the next phase, the final version was tested on 30 subjects to determine the comprehensi-

bility. The final version was found to be 100% comprehensible. No cross-cultural changes were needed for Turkish version.

PARTICIPANTS AND PROCEDURE

The study was carried out between 20 December 2018 and 20 February 2019 at Gazi University Physiotherapy Clinic. The participants were 20-40 years old. All participants were native Turkish speakers and were literate in Turkish. The participants were healthy individuals who had no orthopedic, psychological or neurological, pathologies during the last 12 months. A total of 194 healthy subjects (93 female, 101 male) were included in the study. Participants whose native language was not Turkish, had any disorder that would interfere with the study such as malignancy, hearing or visual problems were excluded from the study. The physical characteristics of the participants including age, height, weight and gender, BHPAQ, and International Physical Activity Questionnaire (IPAQ) were recorded at baseline. BHPAQ was administered the second time after five days.

INSTRUMENTS

The Baecke Habitual Physical Activity Questionnaire BHPAQ was developed by Baecke et al. in 1982.¹¹ It is comprised of 16 questions under three main dimensions related to occupational physical activity (BHPAQ Work, eight questions), physical exercises in leisure score (BHPAQ Sport, four questions) and leisure and locomotion physical activities (BHPAQ Leisure, four questions). The total score is calculated by adding BHPAQ Work+BHPAQ Sport+BHPAQ Leisure scores.

SCORING OF THE BHPAQ

■ The occupational activity dimension was determined according to the Nutrition Council of the Netherlands as; 1) a low activity level consisting of occupations such as; housework, driving, clerical work, teaching, medical practice, managing a store, studying and occupations which require a university education; 2) a middle activity level consisting of occupations such as; carpentry, factory work, farming and plumbing; 3) a high activity consisting of occupations such as; construction labor, dock labor and

professional sport. The BHPAQ dimension of occupation was calculated according to the formula provided below:

$$((6-(\text{sitting score})) + \text{SUM (other 7 parameters score)}) \div 8$$

■ The intensity of sport activities is divided into 3 sub-parameters: 1) sports with a low activity level (golf, sailing, billiards, bowling, etc) that have an energy expenditure average of 0.76 MJ/h; 2) sports with a middle activity level (cycling, badminton, tennis, swimming, dancing) that have an energy expenditure average of 1.26 MJ/h; 3) and sports with a high activity level (football, basketball, rugby, boxing, rowing) that have an energy expenditure average of 1.76 MJ/h. BHPAQ Dimension of Sport was calculated according to the formula provided below.

Sports dimension = ((intensity of most frequently performed sport) * (weekly duration of most frequently performed sport) * (yearly proportion of most frequently performed sport)) * ((intensity of second frequently performed sport) * (weekly time of second frequently performed sport) * (yearly proportion of second frequently performed sport))

$$(\text{SUM (4 parameters score)}) \div 4$$

■ BHPAQ dimension of Leisure was calculated according to formula below:

$$((6-(\text{television watching duration score})) + \text{SUM (remaining 3 items score)}) \div 4$$

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

IPAQ is a questionnaire developed with the aim of measuring health-related physical activity.¹⁸ The validity and reliability of the Turkish version of IPAQ was shown by Saglam et al.¹⁹ IPAQ long form was preferred in the present study as it is more comprehensive. IPAQ long form covers four domains of physical activity: work-related physical activity, housework or gardening activity during transportation, and leisure-time activity. The moderate and vigorous activity time (per day) and number of days spent (per week) in each of the activity domains were recorded by each participant. In the calculation of the physical activity of each week, the amount of hours spent in each activity dimension was multiplied by

the metabolic equivalent task (MET) value of the specific activity. Walking time is assessed in the domains of work, transportation and in leisure time. As reported by the American College of Sports Medicine, 3-6 MET corresponds to moderate intensity activity and >6 MET corresponds to vigorous intensity activity.²⁰

ASSESSMENT OF CONSTRUCT VALIDITY

The Turkish versions of the BHPAQ and IPAQ were administered to all participants in order to perform the validation process. It was requested from all participants to read the questions carefully and give answers to all of the questions on both of the questionnaires. The long form of the IPAQ was used in the current study.

REPRODUCIBILITY ASSESSMENT

Test-retest was used to determine the reproducibility which indicates obtaining similar results when the questionnaire is given to the same individual on separate occasions. Thus, the BHPAQ was completed by all the participants for the second time, five days following the first assessment.

STATISTICAL ANALYSIS

IBM SPSS Statistics for Windows, version 25.0 (IBM Corp., Armonk, N.Y., USA) was used for analysis of

data. A statistically significant p-value was considered as <0.05. The statistics regarding reproducibility and construct validity of BHPAQ are described in the section below. When determining the relationships between parameters, Spearman's rank correlation coefficient was used. The target sample size was reached with a probability of 0.05 and 80% power.

REPRODUCIBILITY

For determining the test-retest value following parameters were used: absolute agreement definition, and two-way mixed effect model. An intraclass correlation coefficient (ICC) of 0.70 and above was considered to be good.²¹

CONSTRUCT VALIDITY

IPAQ was used for construct validity of the BHPAQ. Correlation coefficients of 0.6-0.79 were stated as high correlation, 0.4-0.59 were stated as moderate and <0.4 were considered as low correlation coefficients.²¹

RESULTS

A total of 194 participants (101 males and 93 females) were included in the study. The participants' mean age was 35.2±10.3 years, mean height was 170.3±9.1 centimeters and the mean weight was

TABLE 1: Demographic characteristics and physical activity related data.

n=194	Median (IQR 25/75)	Mean±SD	Minimum-Maximum
Age (years)	32.0 (27.0/44.0)	35.2±10.3	19-65
Height (cm)	70.0 (60.0/82.0)	170.3±9.1	150.0-195.0
Weight (kg)	170.0 (164.0/177.0)	72.3±14.5	44-110.0
Body mass index (kg/m ²)	24.1 (22.0/27.5)	24.8±4.1	17.2-36.9
Work duration (months)	60.0 (27.0/120.0)	101.1±105.7	1-483
BHPAQ work (score)	3.0 (2.5/3.4)	3.0±0.6	1.8-4.6
BHPAQ sport (score)	2.3 (1.8/3.0)	2.4±0.8	1.0-4.8
BHPAQ leisure (score)	2.5 (2.0/3.0)	2.5±0.6	1.0-4.5
BHPAQ total (score)	44.0 (39.0/48.0)	43.8±6.0	28-64
IPAQ work total (MET)	1820.5 (495.0/5359.5)	5180.1±8356.5	0.0-45864.0
IPAQ transport total (MET)	594.0 (247.5/924.0)	992.5±2711.9	0.0-35640.0
IPAQ home total (MET)	360.0 (0.0/885.0)	1006.2±1921.6	0.0-1440.0
IPAQ leisure total (MET)	297.0 (0.0/960.0)	967.9±2266.0	0.0-21744.0
IPAQ total (MET)	4485.5 (1939.5/9895.5)	8125.2±9951.2	0.0-54180.0

cm: Centimeter; kg: Kilogram; kg/m²: Kilogram/square meter; BHPAQ: Baecke Habitual Physical Activity Questionnaire; IPAQ: International Physical Activity Questionnaire; MET: Metabolic equivalent task; IQR 25/75: Interquartile range 25/75; SD: Standard deviation.

TABLE 2: Test-retest of the questionnaire.

n=194	First assessment	Second assessment	ICC
	IQR (25/75)	IQR (25/75)	
BHPAQ work (score)	3.0 (2.5/3.4)	3.0 (2.5/3.5)	0.99
BHPAQ sport (score)	2.3 (1.8/3.0)	2.3 (1.8/3.0)	0.99
BHPAQ leisure (score)	2.5 (2.0/3.0)	2.5 (2.0/3.0)	0.99
BHPAQ total (score)	44.0 (39.0/48.0)	44.0 (40.0/48.0)	0.98

BHPAQ: Baecke Habitual Physical Activity Questionnaire; IQR 25/75: Interquartile Range 25/75; ICC: Intraclass correlation coefficient.

TABLE 3: Construct validity and correlations.

n=194	BHPAQ work (score)	BHPAQ sport (score)	BHPAQ leisure (score)	BHPAQ total (score)
Age (years)	rho=0.10 p=0.148	rho=-0.21 p=0.003	rho=-0.31 p<0.001	rho=-0.07 p=0.360
BMI (kg/m ²)	rho=0.151 p=0.035	rho=-0.164 p=0.023	rho=-0.141 p=0.50	rho=0.006 p=0.934
IPAQ work total (MET)	rho=0.61 p<0.001	rho=0.02 p=0.812	rho=0.04 p=0.586	rho=0.40 p<0.001
IPAQ transport total (MET)	rho=0.05 p=0.469	rho=0.24 p=0.001	rho=0.36 p<0.001	rho=0.27 p<0.001
IPAQ home total (MET)	rho=0.18 p=0.011	rho=0.03 p=0.680	rho=0.004 p=0.959	rho=0.12 p=0.093
IPAQ leisure total (MET)	rho=-0.04 p=0.576	rho=0.56 p<0.001	rho=0.31 p<0.001	rho=0.33 p<0.001
IPAQ total (MET)	rho=0.54 p<0.001	rho=0.19 p=0.009	rho=0.15 p=0.038	rho=0.47 p<0.001

kg/m²: Kilogram/square meter; BMI: Body mass index; BHPAQ: Baecke Habitual Physical Activity Questionnaire; IPAQ: The International Physical Activity Questionnaire; MET: Metabolic equivalent task; rho: Spearman's Rank Correlation Coefficient.

72.3±14.5 kilograms. Demographic characteristics and physical activity related data were summarized in Table 1. Reproducibility was found excellent for BHPAQ total score, and subscores (Table 2). BHPAQ total score was found moderately related to IPAQ total score. There were also poor-moderate relationships between BHPAQ subscores and related IPAQ subscores (Table 3). Age was found negatively related to BHPAQ Sport and BHPAQ Leisure subscores (Table 3).

DISCUSSION

The findings of the present study revealed that the Turkish version of BHPAQ and its sub-scores show excellent reproducibility and moderate construct validity. Other attempts in the literature, showed similar results to ours.

The reproducibility of BHPAQ was reported above 0.70 in all other language versions.^{11,16,22} Recently, Sadeghisani et al. reported that the Persian version of BHPAQ shows good-excellent ICC values as 0.95, 0.93, 0.77 and 0.88 for BHPAQ Work, BHPAQ Sport, BHPAQ Leisure, and BHPAQ Total scores, respectively.¹⁴ The test-retest time was five days in the present study therefore, our results might be higher than the previously reported values. The time between test and retests might deteriorate the results. For example, the reproducibility of the modified BHPAQ was reported as 0.82 after 5 months, and 0.73 after 11 months.²³ However, as other studies showed acceptable ICC values, it might be concluded that the BHPAQ is a reliable instrument in many languages.

Sadeghisani et al. reported a lower relationship (r=0.36) between IPAQ Total scores and BHPAQ

Total scores. Oyeyemi et al. reported poor to moderate correlations (Pearson correlations between 0.08 and 0.60) between BHPAQ and IPAQ short form in South African population.²⁴ However, the IPAQ has poor to moderate correlation with other physical activity measurements in the literature, on the other hand BHPAQ showed moderate correlation with the gold standard physical activity measurement (double labeled water method).²⁵ In addition, Ho et al. stated that there was a moderate correlation ($r=0.61$) between Chinese version of modified BHPAQ and 3-day activity diary.¹² It seems that both objective and subjective methods have moderately related to BHPAQ. On the other hand, Turkish version of IPAQ was conducted in college students. Therefore, it might be not valid enough to determine the physical activity level for other age groups.

The highest significant correlation ($\rho=0.61$) was observed between IPAQ Work and BHPAQ Work sub-scores, while lowest significant correlation ($\rho=0.15$) was found between IPAQ Total and BHPAQ Leisure scores in our study. Age was found to be negatively related to BHPAQ Leisure and BHPAQ Sport, but not to BHPAQ Work. This can be explained that Leisure and Sport activities might decrease with aging, while work related physical activity should be maintained, and therefore age has no relationship with BHPAQ Work scores.

The present study was conducted with only adult participants and therefore this might be counted as a limitation because it does not include participants from every age range.

CONCLUSION

According to results of this study, the Turkish version of BHPAQ, and its subscales have excellent reliability, and moderate validity in the measurement of physical activity levels in the healthy adult Turkish population. Future research should be focused on the validity and reliability of BHPAQ in different pathologies. In addition, the validity of the questionnaire should be investigated by using objective methods such as accelerometers.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Gökhan Yazıcı; **Design:** Melek Volkan-Yazıcı; **Control/Supervision:** Deniz Bayraktar; **Data Collection and/or Processing:** Fatmagül Varol, Çağla Özkul; **Analysis and/or Interpretation:** Gökhan Yazıcı; **Literature Review:** Melek Volkan-Yazıcı; **Writing the Article:** Deniz Bayraktar; **Critical Review:** Çağla Özkul; **References and Fundings:** Gökhan Yazıcı; **Materials:** Fatmagül Varol.

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