Adaptation of Brunel Lifestyle Physical Activity Questionnaire into Turkish; The Validity and Reliability Study

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Abstract

Background: This study aims to investigate the reliability and validity of the Turkish version of the Brunel Lifestyle Physical Activity Questionnaire (BLPAQ) and examine the cultural adaptation of the questionnaire.

Methods: After the translation process, the test-retest reliability of the Turkish version of the questionnaire was analyzed with 24 (31.20 ± 5.0 years old; 50% female) participants (2nd test was done 15 days after the first test). In addition, the validity of the scale was evaluated by the correlation between the BLPAQ and the International Physical Activity Questionnaire Short Form (IPAQ-SF) completed by 113 (30.59 ± 5.40 years old; 63.7% Female) participants.

Results: A powerful positive and significant correlation was found between the correlation coefficients of the BLPAQ's PPA and UPA subscales between both tests (respectively $r=0.96$, $p<0.01$; $r=0.87$, $p<0.01$). The Cronbach's alpha coefficient was found to be 0.77 (quite reliable). The PPA subscale of the BLPAQ was positive with the IPAQ-SF's high-intensity physical activity subscale ($r=0.47$ $p=0.00$) and total IPAQ-SF excluding sitting ($r=0.50$ $p=0.00$) medium in the direction and low positive correlation with the walking activity subscale ($r=0.25$ $p=0.024$). No significant correlation was found between the UPA subdivision of BLPAQ and IPAQ-SF ($p>0.05$).

Conclusion: BLPAQ, adapted into Turkish, is a valid and reliable tool that can be used to determine lifestyle according to physical activity level.

Introduction

Physical activity is any bodily movement produced by skeletal muscle contraction resulting in energy expenditure above the basal level. Exercise is defined as a subset of physical activity that is planned, structured, repeated, and performed intending to improve health or wellness (1). Physical inactivity is associated with many chronic diseases, premature death, and significant economic burden. Increasing evidence also suggests that high levels of inactivity may increase the risk of chronic disease and death (2).

Beyond improving vitality and endurance levels, it is generally accepted that physical activity plays an important role in promoting physical and psychological health by reducing chronic (cardiovascular and metabolic disorders, diabetes, cancer, obesity, and osteoporosis) diseases, mental disorders (chronic stress, anxiety, and depression) and all causes of death (3). Being physically active is a common message in health promotion settings, as there is very strong evidence to support the health benefits of physical activity (4). As a result, increasing the level of physical activity has become one of the priorities of public health policies in many developed countries worldwide. Over the last three decades, there has been a rapid increase in the number of interventions to increase physical activity worldwide, although with limited effects (5). In 2018, the World Health Assembly approved the Global Plan of Action on

Physical Activity 2018–2030. It adopted a new voluntary global target to reduce the global level of physical inactivity in adults and adolescents by 15% by 2030 (6).

It is nearly impossible to accurately assess the effects of physical activity interventions without validated physical activity measurement questionnaires. Although technologies such as pedometers and accelerometers have increased the objectivity and accuracy of physical activity measurements, self-reported survey methods still have the advantage of reaching a large majority of the general population due to their low cost (7). Measuring lifestyle physical activity by self-administered behavioral assessment facilitates effective screening, monitoring, and intervention (8). Interventions resulting from valid and reliable physical activity measurements, which form the basis of future epidemiological studies, contribute to physiological and psychological health (9).

Physical activity interventions need to move towards mass media approaches that use newer technologies, such as the Internet, more effectively (10). It has been suggested that to maintain optimal health; people should engage in at least 30 minutes of daily physical activity that includes both planned and unplanned modes (11). In most previous studies, scales were designed to determine physical activity behaviors without distinguishing between planned and unplanned modes (12,13). The theoretical foundations of the internet-based Brunel Lifestyle Physical Activity Questionnaire developed by Karageorghis et al. reflect the need to distinguish between planned and unplanned physical activity (10). The Brunel Lifestyle Physical Activity Questionnaire, a valid and reliable questionnaire suitable for use among the UK population, has not yet been validated and reliable in any other language or population.

Healthcare professionals are positioned to promote the health behaviors of others, but some evidence suggests that healthcare professionals do not engage in adequate levels of physical activity (14). Healthcare professionals constitute a group that is physically and mentally burdened. Work shifts, demanding tasks, and family issues make planning and performing physical exercise difficult for healthcare workers (15). A few studies have highlighted that health workers do not exercise enough but also have a high risk of unhealthy food intake, alcohol abuse, and occupational burnout (16,17).

This study investigates the reliability and validity of the Turkish version of the Brunel Lifestyle Physical Activity Questionnaire and examines the questionnaire's cultural adaptation.

Materials And Methods

Permission was obtained by e-mail from Dr. Karageorghis, who developed the questionnaire to adapt the Brunel Lifestyle Physical Activity Questionnaire (BLPAQ) into Turkish. This study was approved by the Marmara University Faculty of Health Sciences Non-Invasive Clinical Studies Ethics Committee (Approval date and number: 28.01.2021/ 04). In addition, all authors complied with the ethical rules of the Declaration of Helsinki.

Translation And Cross-cultural Adaptation

Internationally accepted guidelines were used to translate the Brunel Lifestyle Physical Activity Questionnaire into Turkish and its cross-cultural adaptation (18,19). First, the questionnaire was translated from English to Turkish by two independent people whose mother tongue is Turkish and who know English well, and who are not familiar with the scale. The people who translated the questionnaire into Turkish came together and combined both translations into a single translation. Next, the Turkish version of the questionnaire was translated back into English by two native English speakers and fluent in Turkish. The two questionnaires translated from Turkish to English were synthesized and compared with the original, and converted into a single translation by the authors. In order to adapt the scale to Turkish and to evaluate its cultural adaptation, the English and Turkish texts were compared by a translation group consisting of physiotherapists and two sworn translators, inconsistent parts and meaning differences in the text were checked, and then the first draft of the Turkish version and the translated English version of the questionnaire was obtained. The questionnaire, which was translated back into English, was sent to the author who developed the questionnaire to determine whether there was a change in meaning. Approval was obtained from Dr. Karageorghis that the questionnaire was translated back into English and the original was equivalent. In order to determine the intelligibility of the questionnaire, a pilot study was conducted with randomly selected 30 Turkish-speaking participants.

Participants

Due to the pandemic conditions, the questionnaire was organized in a practical way on the online platform. The research was carried out to cover physiotherapists across Turkey using the Google form survey method. Volunteers aged 21-51 and above, who were actively working as a physiotherapist in the health institution, were native Turkish speakers, had at least one year of professional experience, were included in the study. Individuals with health problems that prevent physical activity (musculoskeletal disorder, neurological disorder, recent trauma, etc.), those who were not working actively or not being a physiotherapist, and those who did not speak Turkish were excluded from the study.

The survey was disseminated through the circulation of Google forms on private social networking media. In addition, a group e-mail from several universities, academic institutions and their interconnections was used to share survey links. When the participant opened the form, they were informed with the voluntary consent form, and then they filled in the questionnaire. Participants whose answer was "No" were completed before the questionnaire was opened (by ticking "Finish the Questionnaire"). Afterward, the participants filled sociodemographic information form, Brunel Lifestyle Physical Activity Questionnaire, and Short Form of the International Physical Activity Questionnaire.

Google Forms filling was done from March 08, 2021, to March 29, 2021. BLPAQ was filled out again by 24 randomly selected participants 15 days after for test-retest reliability. Although the time to answer the questions varies according to each participant, the evaluations took 5-10 minutes on average. The responses were used directly for analysis, and revision of the responses was not allowed.

One of the methods used in calculating the sample size in scale adaptation studies is that the total number of participants should be at least 5-10 times the total number of questions [20, 21]. According to this rule, the data collection process was started to reach at least 70 people with seven times ten questions. A larger sample size was targeted to minimize possible losses during data collection.

Procedures

The sociodemographic form consisted of information about age, gender, in which health branch they worked, in which institution they worked (state, private hospital, university, etc.), professional experience, working hours were recorded. The Brunel Lifestyle Physical Activity Questionnaire (BLPAQ) and the International Physical Activity Questionnaire Short Form (IPAQ-SF) were used to assess the physical activity levels of the participants.

The Brunel Lifestyle Physical Activity Questionnaire (Blpaq)

The Brunel Lifestyle Physical Activity Questionnaire was developed by Karageorghis et al. in 2005 at Brunel University School of Sport and Education (Brunel University, Uxbridge, West London, UK) [10]. The BLPAQ was designed in two parts to assess the planned physical activity (Part A-PPA) and unplanned physical activity (Part B-UPA) components of lifestyle physical activity. Part A: Planned Physical Activity (PPA); Any activity planned into your daily routine that can improve your health, fitness, or well-being (for example, brisk walking, gardening, cycling, team games, etc.). Planned physical activity is a 6-item subsection that addresses the intensity, frequency, and duration of such activity (for example, "How many times do you engage in planned physical activity in a week?"). Part B: Unplanned Physical Activity (UPA); is a 3-item subsection that only addresses the intensity and duration of such activities (e.g., "How vigorously do you engage in these other forms of physical activity?"). The frequency of unplanned behavior is not evaluated because of its transient nature and difficulty obtaining valid measures. Items are graded using a 5-point continuous closed numerical scale for a routine week. Scoring the BLPAQ: (i) For a planned physical activity factor score, items 1-6 are added and divided by 6. (ii) For an unplanned physical activity factor score, the scores from items 7-9 are added and divided by 3. The BLPAQ is a published, valid, and reliable scale measuring planned and unplanned physical activity [10, 22, 23].

International Physical Activity Questionnaire Short Form

The International Physical Activity Questionnaire (IPAQ-SF) is a standardized tool for measuring physical activity developed by researchers from various countries with support from the World Health Organization and the Centers for Disease Control [24]. The Turkish reliability and validity of the questionnaire were done by Sağlam et al. The IPAQ-SF consists of seven items and assesses vigorous physical activity (duration: minutes and frequency: days), moderate physical activity (duration: minutes and frequency: days), and walking time of at least 10 minutes (frequency: days) for the previous seven days. Vigorous

and moderate activity and walking times are converted to metabolic equivalent (MET) corresponding to basal metabolic rate, and total physical activity score (MET-min/week) is calculated. Vigorous physical activity=8 METs for analysis of IPAQ-SF data; moderate physical activity=4 METs; Values such as walking=3.3 METs are used. The test-retest reliability coefficients of the Turkish IPAQ short and long forms were $r = .69$ and $r = .64$, respectively. Walking activity had better reliability coefficients than vigorous and moderate-intensity activities ($r=0.67$; $r=0.50$; $r=0.64$, respectively). The test-retest reliability of the sitting activity items of the Turkish IPAQ short form is acceptable ($r = 0.78$ 95%CI: 0.71) (Sağlam et al., 2010).

Statistical Analysis

The data obtained in this study were analyzed with SPSS (Statistical Package for Social Sciences) 18.0, IBM SPSS AMOS statistical package program. Number, percentage, mean and standard deviation were used in the descriptive statistics of the data. The results were evaluated within the 95% confidence interval, and $p<0.05$ was used as the significance level. Cronbach's alpha value and coefficient were used to determine the internal consistency of the scale. Cronbach's alpha value ranges from 0 to 1. If the alpha value is ≤ 0.40 , the scale is not reliable. If it is between 0.4-0.6, the scale is considered low reliable; between 0.6-0.8, the scale is highly reliable, and between 0.8-1, the scale is considered highly reliable.[26]. The external construct validity and test-retest reliability of the scale were analyzed with the Pearson Correlation Coefficient (r). If the correlation coefficient is below 0.29, it is low; A correlation between 0.30 and 0.69 was considered moderate, and a correlation between 0.70 and 1.00 was considered high [27]. For the external construct validity of the scale, the relationship between the IPAQ-SF score and the PPA and UPA scores of the Brunel Lifestyle Physical Activity Questionnaire was examined. There was examined the correlation of the participant's first test and second test averages in test-retest reliability. Confirmatory factor analysis (CFA) was used to examine the fit indices of the questionnaire in the internal validity of the scale. Multiple fit indices are used in CFA. In this study, as structural equation model, Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Normed Fit Index (NFI), Goodness of Fit Index (GFI), and CMIN/DF values were used [28].

Results

In this study, the Turkish reliability and validity of the Brunel Lifestyle Physical Activity Questionnaire (BLPAQ), developed by Karageorghis et al. 113 people participated in the reliability analysis of our study. 63.7% ($n=72$) of the participants were female and 36.3% ($n=41$) were male. The mean age was 30.59 ± 5.40 years, the mean height was 168.17 ± 8.77 cm, and the mean body weight was 66.37 ± 14.27 kg. 55.8% ($n=55$) of the participants were bachelor's degree, 33.6% ($n=38$) master's, 10.6% ($n=12$) doctoral graduates. 94.7% ($n=107$) of the participants are actively working, and 85% ($n=96$) work full-time. The demographic information of the participants is shown in Table 1.

Table 1
Demographic features and data related to physical activity

	Mean±SD	Minimum-Maximum
n=113		
Age	30.59 ± 5.40	21.0 – 51.0
Gender	1.36 ± 0.48	1.0 – 2.0
Height	168.17 ± 8.77	150.0 – 192.0
Body weight	66.37 ± 14.27	46.0 – 105.0
BMI	23.10 ± 4.36	18.07 – 34.6
Working hour (daily)	7.6 ± 1.96	0.0 – 16.0
BLPAQ-PPA	3.02 ± 0.82	1.0 – 4.5
BLPAQ-UPA	2.70 ± 0.67	1.0 – 5.0
n=76		
IPAQ-7 (high-intensity physical activity)	507.89±814.11	
IPAQ-7 (moderate-intensity physical activity)	302.89±672.45	
IPAQ-7 (walking activity)	679.32±636.64	
IPAQ-7 total (except sitting)	1490.13±1343.23	
SD: Standart deviation; BLPAQ-PPA: Planned Physical Activity BLPAQ-UPA: Unplanned Physical Activity; IPAQ-7: International Physical Activity Questionnaire (Short Form)		

Internal Consistency

Cronbach's alpha value was used to evaluate the internal consistency of the scale. Cronbach's alpha value ranges from 0 to 1. In this study, the Cronbach's alpha coefficient of the Turkish version of the BLPAQ was found to be 0.77 (highly reliable).

Test-retest Reliability

Test-retest was used to determine the reproducibility, which showed that similar results were obtained when the scale was given to the same person at different times. In this study, 24 people participated in the test-retest. 50% (n=12) of the participants were female and 50% (n=12) were male. The mean age was 31.20±5.05 years, the mean height was 168±9.80 cm, and the mean body weight was 67.70±15.47 kg. The scale was reapplied to 24 subjects 15 days later. There was examined the correlation of the

participant's first test and second test averages in test-retest reliability. A powerful positive and significant correlation was found between the correlation coefficients of the PPA and UPA subscales of the BLPAQ between both tests ($r=0.96$, $p<0.01$, respectively; $r=0.87$, $p<0.01$) (Table 2).

Table 2
Test-retest reliability of the Brunel Lifestyle Physical Activity Questionnaire

n=24	Test 1	Test 2		
	Mean±SD	Mean±SD	r	p
PPA	2.5±0.15	3.11±0.16	0.963	0.001
UPA	2.87±0.16	2.81±0.16	0.876	0.001
SD: Standart Deviation; BLPAQ-PPA : Planned Physical Activity BLPAQ-UPA : Unplanned Physical Activity; r : Pearson Rank Correlation Coefficient ICC : Intraclass correlation coefficient; CI : Confidence interval				

Exterior Validity

In our study, since there were some missing and erroneous data in the IPAQ-SF, the data of 76 people (mean age 30.63 ± 5.38 years; 49 (64.5%) women) were analyzed in the external construct validity of the questionnaire. In this study, it was determined that the PPA subscale of the BLPAQ was positively moderately correlated with the high-intensity physical activity subscale of IPAQ-SF and the total IPAQ-SF excluding sitting ($r=0.47$ and $r=0.5$), respectively. In addition, it was determined that there was a low positive correlation with the walking activity subscale ($r=0.25$). No significant correlation was found between the IPAQ-SF total score (except sitting) and subscales of the UPA subsection of the BLPAQ ($p>0.05$) (Table 3).

Table 3
Correlation between the Turkish Brunel Lifestyle Physical Activity Questionnaire and the International Physical Activity Questionnaire-7 (Short Form)

Variable	PPA		UPA	
	r	p	r	p
High-Intensity Physical Activity	0.478	0.000**	0.068	0.561
Moderate-Intensity Physical Activity	0.179	0.121	0.223	0.053
Walking Activity	0.259	0.024*	0.040	0.733
Total UFAA-7	0.502	0.00**	0.171	0.139
UFAA-7: International Physical Activity Questionnaire-7 (Short Form); PPA: Planned Physical Activity; UPA: Unplanned Physical Activity; r= Pearson Rank Correlation Coefficient. **. Correlation is significant at the 0.01 level (2-tailed). * . Correlation is significant at the 0.05 level (2-tailed).				

Internal Construct Validity

For the internal validity of the BLPAQ, some fit indices of the CFA were examined. The fit indices used as structural equation models of CFA in this study were found to be RMSEA=0.051, CFI=0.976, NFI=0.903, GFI=0.936, CMIN/DF=1,288 (Table 4,). These results show that the BLPAQ showed good fit.

Table 4
Structural Equation Models

CMIN/DF	1.288
RMSEA	0.051
CFI	0.976
NFI	0.903
GFI	0.936
RMSEA: Root Mean Square Error of Approximation; CFI: Comparative Fit Index; NFI: Normed Fit Index; GFI: Goodness of Fit Index	

Discussion

This study was conducted to test the reliability and validity of the Turkish version of the BLPAQ questionnaire in the evaluation of physical activity in a sample of physiotherapists. The Turkish version of the BLPAQ, which evaluates physical activity, is the first Turkish questionnaire designed to assess

planned and unplanned physical activity. The study results show that the Turkish version of the BLPAQ is a reliable and valid questionnaire for research and application areas with strong measurement features. The essential features required for a good assessment tool are validity and reliability [29].

The test-retest reliability of the BLPAQ was made in English only by the developers of the scale. In the test-retest reliability study of the BLPAQ by Vencato et al., Pearson's product-moment correlations were reported to range from $r = 0.95$ to 0.96 for the PPA subscale and $r = 0.93$ to $r = 0.98$ for the UPA subscale [22]. The test-retest reliability of the Turkish version of the BLPAQ was found to be similar to the original English version. Karageorghis et al. reported that the internal consistency Cronbach's α coefficients of the first version of the BLPAQ were 0.90 for the PPA subscale and 0.68 for the UPA subscale and BLPAQ is a reliable tool for evaluating physical activity. [10]. In this study, the Cronbach's α coefficient for the internal consistency of the Turkish version of the BLPAQ was determined to be 0.77 .

Direct and indirect methods can do a validity assessment of a scale. In the direct method, the correlation between scores obtained from a questionnaire and those obtained from the measurement of physical activities recorded with an instrument such as a pedometer and accelerometer is calculated [30, 31]. In the indirect method, a correlation is calculated between the scores obtained from a specific scale and those obtained from a valid scale [32, 33]. Indirect evaluation of physical activities is easier to use, cheaper, and more time-saving [32, 34]. As for this study, IPAQ-SF was chosen as a valid questionnaire to test the validity of the Turkish version of BLPAQ.

Vencato et al. examined the relationship between the BLPAQ and the Baecke Habitual Physical Activity Questionnaire (BQHPA) and Godin's Leisure-Time Exercise Questionnaire (GLTEQ). They noted that correlations between BLPAQ subdivisions and BQHPA indices and GLTEQ subscales indicate reasonable concurrent validity of the BLPAQ ($r = 0.11 - 0.64$). The results of linear regression analysis for PPA stated that BQHPA showed a moderate positive correlation with the Sport index ($B = 0.67$, $\beta = 0.47$, $p < 0.001$). They reported that PPA showed a low positive correlation with all indices except the mild subscale of BQHPA and with all subscales of GLTEQ. It was stated that these findings are in line with expectations as the intensity of PPA is likely to be moderate to severe, and the scale does not systematically plan to participate in activities of very light intensity [23]. In this study, it was determined that the PPA subscale of the BLPAQ was positively moderately correlated with the high-intensity physical activity subscale of IPAQ-SF and the total IPAQ-SF excluding sitting ($r = 0.47$ and $r = 0.5$), respectively. In addition, it was determined that there was a low positive correlation with the walking activity subscale ($r = 0.25$). Walking activity MET value of 3.3 in IPAQ-SF is an activity level. These results are consistent with the work done by Vencato et al. They stated that there was a low positive correlation with the BQHPA's Work ($B = 0.36$, $\beta = 0.30$) and Leisure indices ($B = 0.23$, $\beta = 0.22$) and GLTEQ's Sweat ($B = 0.20$, $\beta = 0.22$) subscale in linear regression analysis of the UPA subsection of the BLPAQ ($p < 0.001$). They emphasized that these results are expected because the UPA evaluates light-intensity activities, and high-intensity activities require some degree of planning [23]. In this study, there was a positive correlation between the IPAQ-SF total score (except sitting) and subscales of the UPA subsection of the BLPAQ, but this relationship was not significant ($p > 0.05$). In the literature, physical activity measures are generally correlated in a similar range ($r = 0.20$ -

0.50) [33–35]. This study was conducted by Vencato et al. and is consistent with studies examining the relationships of other physical activity questionnaires in the literature.

A possible limitation of this study is that it was conducted on a limited occupational population. Only the physical activity levels of physiotherapists were questioned. Such participants are likely to differ from the general population in their physical activity behavior. The low physical activity scores of the physiotherapists participating in the study indicate that they are less active. The vast majority (85%) of the physiotherapists participating in the study stated that they worked an average of 7-8 hours a day. Therefore, the planned physical activity scores may have been low. Their workload is too high, and they do not have time to do different activities outside of work may also have caused this. Although Therefore, care should be taken when generalizing the present results to the more active population, other occupational groups, and a sick population. The findings of this study support the use of the Turkish version of the BLPAQ; more studies are needed to evaluate the scale in different Turkish populations.

Conclusion

This study shows that the Brunel Lifestyle Physical Activity Questionnaire, adapted into Turkish, is a valid and reliable scale that can determine lifestyle according to physical activity level.

Abbreviations

BLPAQ: Brunel Lifestyle Physical Activity Questionnaire; IPAQ-SF: International Physical Activity Questionnaire Short Form; MET: Metabolic equivalent for task; CFA: Confirmation factor analysis; RMSEA: Root mean square error of approximation; CFI: Comparative fit index; NFI: Normed fit index; GFI: Goodness of fit index; PPA: Planned physical activity; UPA: Unplanned physical activity.

Declarations

Ethics approval

This study was approved by the Marmara University Faculty of Health Sciences Non-Invasive Clinical Studies Ethics Committee (Approval date and number: 28.01.2021/ 04). All participants gave electronically written consent before participating in the study.

Consent for publication

Not applicable.

Availability of data and materials

The data is available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

Not applicable.

Authors Contribution

BAE and CGY designed the study. MA performed the statistical analysis. All authors contributed to the interpretation of the data. BAE, CGY and MA drafted the manuscript. ZS supervised and revised the manuscript. All authors contributed in the preparation of the article, and all authors approved the final manuscript.

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