Int J Nutr Sci 2026;11(3):1-7

International Journal of Nutrition Sciences

Journal Home Page: ijns.sums.ac.ir

ORIGINAL ARTICLE

Assessment of Reliability and Content Validity of Adapted Persian Version of Physical Activity Level Questionnaire in MASHAD Cohort Study, Mashhad, Northeastern Iran

Najmeh Seifi[1#], Niloufar Abdollahpour[1,2#], Sara Saffar Soflaie[3], Gordon A. Ferns[4], Habibollah Esmaily[5*], Majid Ghayour-Mobarhan[3*]

1. Department of Clinical Nutrition, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran
3. Metabolic Syndrome Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
4. Division of Medical Education, Brighton & Sussex Medical School, Falmer, Brighton, Sussex, UK
5. Department of Biostatistics, School of Health, Mashhad University of Medical Sciences, Mashhad, Iran
#Equally contributed as the first author

ARTICLE INFO

Keywords:
Reliability
Validity
Physical activity
Persian version
Physical activity Questionnaire

**Corresponding authors:*
Habibollah Esmaily, PhD;
Department of Biostatistics, School of Health, Mashhad University of Medical Sciences, Mashhad, Iran.
Email: EsmailyH@mums.ac.ir
Majid Ghayor-Mobarhan, MD, PhD;
Department of Clinical Nutrition, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran.
Email: Ghayourm@mums.ac.ir
Received: April 9, 2026
Revised: July 2, 2026
Accepted: July 10, 2026

ABSTRACT

Background: Physical activity is an important part of a healthy lifestyle by reducing the risk of chronic diseases. Noticing the importance of measuring physical activity in medical investigations, the purpose of this study was to evaluate the reliability and validity of the Physical Activity Level (PAL) questionnaire adapted from the Scottish Heart Health Study (SHHS)/monitoring trends and determinants in cardiovascular disease (MONICA) questionnaire to be used in Mashad Cohort Study.

Methods: This cross-sectional study was conducted among thirty-five healthy participants aged 35-65 years, living in Mashhad, Iran. Translation of the physical activity level (PAL) questionnaire was performed using forward-backward method. Test–retest reliability was evaluated by Intra Class Correlation (ICC) coefficient. Content validity, according to the opinions of 15 experts, was investigated by using Content Validity Ratio (CVR) and content validity index (CVI).

Results: The ICC was reported to be 0.887 (95% CI: 0.779-0.956). The CVR was 0.47 for the first question, 1 for the next two, 0.87 for the fourth and fifth, and 0.33 and 0.2 for the sixth and seventh, respectively. The I-CVI (R) was equal to 1 for all the questions.

Conclusion: The adapted Persian version of PAL questionnaire was shown to be a reliable and content valid instrument to measure PAL in 35-65 years old healthy population.

Please cite this article as: Seifi N, Abdollahpour N, Saffar Soflaie S, Ferns GA, Esmaily H, Ghayour-mobarhan M. Assessment of Reliability and Content Validity of Adapted Persian Version of Physical Activity Level Questionnaire in MASHAD Cohort Study, Mashhad, Northeastern Iran. Int J Nutr Sci. 2026;11(3):1-7.

Introduction

Physical activity is a very important part of a healthy lifestyle throughout all stages of life (1). The advantages of living a physically active life have been proved and well-documented by research in the prevention of a whole range of both mental disorders and chronic diseases (1, 2). Colon cancer, heart diseases, breast cancer, type 2 diabetes, bone fractures, and obesity are among some of the most important diseases that are positively affected by physical activity (3-7). Reduction of depression, anxiety, and stress levels as well as improvement in the overall mental health are some of the other benefits of being physically active (8). For instance, an estimate reported by the World Health Organization (WHO) in 2002 noted that approximately 1.9 million fatalities and 19 million lost valuable working days were attributed to physical inactivity (9).

Selection of a suitable assessment tool in large-scale epidemiological studies is a real challenge for researchers and techniques employed to rate physical activity vary greatly from study to study (10, 11). Doubly labeled water, 7-day recall, diaries, movement sensors, and questionnaires are some common techniques used for measuring physical activity with the gold standard being the doubly labeled water which measures the total energy spent by the individual (12). This method, however, does not meet the requirements of the studies on larger populations as it is both expensive and complex (13). Recall bias is a possible issue with the questionnaire method (14). However, this technique is practical, simple and affordable. That is why most epidemiological studies are based on questionnaires in assessing physical activity. This is presently good enough because no reliable, relatively noninvasive technology exists for assessing physical activity for the time being (13, 15).

Considering the critical importance of assessing physical activity, researchers have designed different questionnaires for various fields of activities. Some of the results include International Physical Activity Questionnaire (IPAQ), which was developed in 1990 in the process of a multi-center study (14 centers) located in 12 different countries. The project, sponsored by WHO, was outlined in two long and short scales including 31 and 13 questions respectively (16). IPAQ is in fact the same as Global Physical Activity Questionnaire (GPAQ) which was standardized to be used with cross-regional studies (17). It is also possible to mention European Prospective Investigation into Cancer (EPIC) Nutrition (13), Framingham Physical Activity Questionnaire (18), Baecke Physical Activity Questionnaire (19) and Taylor *et al.* physical activity questionnaire (20).

The physical activity level (PAL) questionnaire, adapted from the Scottish Heart health Study (SHHS)/MONICA questionnaire, assesses current (past year) physical activity based on time spent at work, leisure time, as well as time spent in bed. Despite a global abundance of instruments for measuring physical activity, the lack of such tools is highly felt in Iran. As physical activity patterns and accuracy of self-reports may differ across cultural/ethnic backgrounds or gender differences, it is necessary to use reliable and validated instruments for each study population (21). Few questionnaires have been tested on the Iranian adult populations for the assessment of physical activity (22-24). In order to address the lack of studies on the topic under discussion, in this paper we decided to examine the validity and reliability of an adapted questionnaire translated into Persian. This questionnaire was intended to be used in data collection of Mashad Cohort Study.

Materials and Methods

To assess the validity and reliability of the adapted Persian version of physical activity level (PAL) questionnaire in 2025, thirty-five healthy participants aged 35-65 years were included in this investigation. As this questionnaire was intended to be used in Mashad Study data collection, the participants were in the same age range as Mashad study's participants. The Mashad study is a prospective cohort study conducted among the population residing in Mashhad, northeastern Iran, aimed at estimating the risk of atherosclerosis. Each participant provided written consent. Pregnant and lactating women were not included in this study. All experiments were performed in accordance with the declaration of Helsinki and Mashhad University of Medical Sciences ethical guidelines and regulations. The research protocol was approved by the Research Ethics Committees of School of Medicine, Mashhad University of Medical Sciences (IR.MUMS.MEDICAL.REC.1386.250). All participants signed a written inform consent before participating in the study.

PAL was assessed using James and Schofield human energy requirement equation (25). Estimation of energy requirement was undertaken as three components of basal metabolic rate (BMR), thermic response to food ingestion (TR), and PAL. The TR was incorporated into PAL, estimated to provide two components, and the PAL then expressed as a multiple of BMR (25). The physical activity questions based on James and Schofield equation were selected from

the Scottish Heart health Study (SHHS)/monitoring trends and determinants in cardiovascular disease (MONICA) questionnaire (26). In this questionnaire, questions were divided into time spent on activities during work time (including house work), during leisure time, and in the bed (including reading in bed, napping and sleeping). Activities during work-time and leisure time were divided into three categories of very active, active and non-active, providing different examples for each category. This simplified description of activities let the participants decide how many hours dedicated to each category of activities. As shown in Table 1, the integrated energy index (IEI) for men at inactive, moderate, and active levels were 1.51, 2.49, and 4.34, respectively. The IEI for women at inactive, moderate, and active levels were 1.61, 2.52, and 4.39, respectively.

As the IEI for men and women at different levels of activities was determined, the total energy expenditure (TEE) for a 24-hour period was calculated. Then, TEE divided by BMR provided the physical activity level. BMR was estimated using the Food and Agriculture Organization (FAO)/World Health Organization (WHO)/United Nations University (UNU) equation (Table 2) (27). PAL was calculated as TEE/BMR. Individuals with 1-1.39 physical activity levels were classified as inactive groups, and those with PAL between 1.4-1.59 and 1.6-1.89 were categorized as low activity and moderate activity groups, respectively. The physical activity level of high-activity subjects was 1.9-2.5. Participants' weight and height were measured without shoes and with light clothes. Weight was measured by a calibrated scale and rounded to the nearest 0.1 kg. Height was measured by a wall-mounted instrument rounded to the nearest 0.5 cm. Body mass index (BMI) was calculated as weight/height^2 (kg·m^2).

After following the process of forward-backward translation, 20 subjects (aged 18-65 years) were invited to fill out the Persian version of the questionnaire in two independent sessions (3-5 days after the first session) in order to determine the reliability index. SPSS software (Version 25.0, Chicago, IL, USA) was used for all analyses. To evaluate reliability, the interclass correlation coefficient (ICC) was used. A 95% confidence interval (CI) was reported to describe the variety in the ICCs. ICC values were interpreted as 0.81-1.0=excellent; 0.61-0.80=very good; 0.41-0.60=good; 0.21-0.40=fair; and 0-0.20=poor.

The Content Validity Ratio (CVR) evaluated the necessity of each item. We requested the fifteen experts (7 nutritionists, 4 sport physiologists, and 4 epidemiologist) to assess the necessity of the physical activity level questionnaire items on a three- point scale as (i) 'not necessary' OR (ii) 'useful but not essential' OR (iii)'essential'. Then, for each item, CVR=(Ne-N/2)/(N/2) was calculated, where Ne=number of experts voting 'essential' and N=total number of recruited experts. We used the Lawshe Table for CVR to check the minimum value of CVR for our number of experts to determine whether our item is valid or not (28). Similarly, for content validity index (CVI), professional evaluated the relevance of the of each PAL questionnaire items on a 4-point rating as (i) 'not relevant', (ii) 'somewhat relevant', (iii) 'quite relevant' OR (iv) 'highly relevant'. CVI (for individual items) was obtained by I-CVI (R)=Nr/N where Nr=number of experts voting and N=total number of recruited experts.

Results

Thirty-five participants (65% females, 70% graduated) completed the questionnaires and anthropometric measurements. The mean age and BMI of study participants were 37.55±14.92 years and 24.19±3.63 kg/m^2. The mean score of PAL in the first and second measurements was 1.69±0.32 and

Table 1: Integrated energy index (IEI) for men and women at different activity levels.

Activity level	Male	Female
Inactive	(0.75×1.54)+(0.25×1.4)=1.51	(0.75×1.68)+(0.25×1.4)=1.61
Moderate	(0.75×2.8)+(0.25×1.54)=2.49	(0.75×2.8)+(0.25×1.68)=2.52
Active	(0.60×6.2)+(0.40×1.54)=4.34	(0.60×6.2)+(0.40×1.68)=4.39

Table 2: Equations for calculating basal energy needs and BMR for adolescents and adults (MJ/day).

Adolescent	Male	Female
(10-17+)	0.0732 W*+2.72	0.0510 W+3.12
Adults		
(18-29+)	0.0640 W+2.84	0.0615 W+2.08
(30-59+)	0.0485 W+3.67	0.0364 W+3.47
(>60)	0.0565 W+2.04	0.0439 W+2.49

*W was the average weight (kg).

Table 3: The CVI and CVR scores for the PAL questionnaire.

Questions	CVR	CVI
1	0.47	1
2	1	1
3	1	1
4	0.87	1
5	0.87	1
6	0.33	1
7	0.20	1

CVR: Content validity ratio, CVI: Content validity index, PAL: Physical activity level.

Table 4: The interclass correlation coefficient (ICC) and 95% CI for each item of the questionnaire in two repeated measurements.

No.	Question content		ICC	95% CI
1	Can you walk?	-	-	-
2	Please specify your physical activity during daily work: (Dear interviewer, please explain the table according to the guide)	-	-	-
3	Work time activities	Very active	0.883	0.739-0.948
		Active	0.828	0.639-0.918
		Inactive	0.894	0.788-0.947
4	Non-work time activities	Very active	0.785	0.492-0.909
		Active	0.890	0.777-0.946
		Inactive	0.770	0.544-0.884
5	In-bed time	Reading book	0.997	0.994-0.999
		Napping during the day	0.886	0.775-0.943
		Sleeping during night	0.939	0.880-0.969
Final score of physical activity level			0.887	0.779-0.956

1.76±0.35, respectively. As it is shown in Table 3, the CVR for the first question was 0.47, for the next two questions, it was 1, and for the fourth and fifth questions, it was 0.87. Other two questions had CVRs of 0.33 and 0.2, respectively. As according to the Lawshe Table (29) for CVR, the minimum value of CVR for our number of experts to determine whether our item is valid or not was 0.49, the first and the last two questions were removed. The I-CVI (R) was equal to 1 for all the questions. Among the four remained questions, question 3-5 were directly involved in the calculation of PAL. In Table 4, the ICC and 95% CI for each part of these questions was presented. The ICC for the final score of PAL was reported to be 0.887 (95% CI: 0.779-0.956). For the second question, ICC was not determined.

Discussion

The results of the current study revealed that the Persian version physical activity level questionnaire adapted from the Scottish Heart health Study (SHHS)/MONICA questionnaire had a good reliability (ICC of 0.893) and content validity and in this sense, and it is in line with other studies (13, 19, 30, 31). The role of physical activity in disease prevention, mental health improvement and quality of life increment have been investigated and confirmed in various studies (14, 32-35). Despite the abundance of measuring tools for physical activity, lack of simple, valid and reliable tools is still felt in Iran (36). Most existing physical activity questionnaires focus on PA during leisure time or at work, which limits the application of these instruments and thus cause errors in the evaluation of the overall amount of physical activity (37). IPAQ overcomes this problem by covering five domains of Job-related, transportation, housework, sport, and leisure-time, and sedentary behaviors. Although, they consider duration (minutes) and frequency (days) of physical activity in the last 7 days, they are relatively more complicated (38, 39).

In the transregional study of Saraik *et al.*, which was conducted in 12 countries to investigate the validity and reliability of IPAQ, the internal correlation coefficient was 30% and the reliability coefficient was 80% for IPAQ (38). In another study, the reliability coefficient of GAPQ was estimated to be 69% after 2 weeks and 55% after 2 months (39). In another study, the reliability of the Beck questionnaire was estimated to be from 78% to 84% for different areas of this questionnaire (40). Meanwhile, the intraclass correlation coefficient

of PAL questionnaire in our study was estimated as 0.89 which is acceptable compared to similar questionnaires.

This study had some limitations that should be considered. First, we only focused on the content validity of the Persian version of the PAL questionnaire in this study, and the PAL results were not compared to a valid instrument or gold standard of the PAL measurement. Second, to determine the reliability and content validity of the questionnaire, in accordance with Mashad study, we included adult healthy population. So, the results may not be generalized to other age groups or patients. Additionally, factors such as the small sample size, low proportion of men, participants' activity levels, and potentially their education levels could affect the results.

Conclusion

The results of this study revealed that the PAL questionnaire in Mashad study was a reliable and valid instrument to measure PAL in adult healthy population.

Acknowledgement

We gratefully acknowledge the support from Mashhad University of Medical Sciences for facilitating this study.

Funding

This study was supported by Mashhad University of Medical Sciences. The funders had no involvement in study design; collection, analysis, and interpretation of data; in the writing of the report; and in the decision to submit the article for publication.

Authors' Contribution

N.S. and S.S.S. designed the study; N.A. participated in data collection and investigation; data analysis was carried out by N.S.; H.E. provided consultations for data analysis; N.S. and N.A. drafted the main manuscript; G.A.F. reviewed and edited the manuscript; funding was obtained by H.E. and M.Gh.; M.Gh. supervised the project.

Conflict of Interest

The authors have no conflict of interest.

References

1 Katzmarzyk PT, Jakicic JM. Physical Activity for Health-Every Minute Counts. *JAMA*. 2023;330:213-4. DOI: 10.1001/jama.2023.11014. PMID: 37462698.

2 Sheikhani Shahin H, Mehrabani D, Nazhvani SD, et al. The effect of aquatic activity and alogenic bone marrow derived mesenchymal stem cells fortified with Platelet-Rich Plasma in treatment of Achilles tendon in rat. *Res Sport Med Technol.* 2022;12:25-41. DOI: 10.29252/jsmt.12.1.25.

3 Dhuli K, Naureen Z, Medori MC, et al. Physical activity for health. *J Prev Med Hyg.* 2022;63:E150-E159. DOI: 10.15167/2421-4248/jpmh2022.63.2S3.2756. PMID: 36479484

4 Sheikhani-Shahin H, Mehrabani D, Ashraf MJ, et al. The healing effect of bone marrow-derived stem cells and aquatic activity in Achilles tendon injury. *J Hellenic Vet Med Soc.* 2019;70:1373-1380. DOI:10.12681/jhvms.20342.

5 Farhmand M, Almasi-Hashiani A, Mehrabani D. Survival rate and its predictors in colorectal cancer patients, southern Iran. *Arak Univ J Med Sci*. 2013;15:54-60. DOI: 10.5829/idosi.mejsr.2012.12.8.6562.

6 Mehrabani D, Ahrari Z, Rezaianzadeh A, et al. Incidence Of Breast Cancer In Fars Province, Southern Iran: A Hospital-Based Study. *World J Plast Surg.* 2012;1:16-21. PMID: 25734039.

7 Dehghanpisheh S, Daryanoosh F, Mehrabani D, et al. The effect of eight weeks aerobic exercise on visfatin level in non-athletic young women, southern Iran. *Middle-East J Sci Res.* 2014;21:314-319. DOI: 10.5829/idosi.mejsr.2014.21.02.8255.

8 Mahindru A, Patil P, Agrawal V. Role of physical activity on mental health and well-being: A review. *Cureus*. 2023;15:e33475. DOI: 10.7759/cureus.33475. PMID: 36756008.

9 Organization WH. The world health report 2002: reducing risks, promoting healthy life: World Health Organization; 2002.

10 McClain JJ, Lee CD, Swan P, et al. Evaluation of physical activity measures used in middle-aged women. *Med Sci Sports Exerc.* 2009;41:1403-12. DOI: 10.1249/MSS.0b013e31819b2482. PMID: 19516161.

11 Mahmoodi R, Daryanoosh F, Kasharafifard S, et al. Effect of exercise on serum adiponectin and lipoprotein levels in male rat. *Pak J Biol Sci.* 2014;17:297-300. DOI: 10.3923/pjbs.2014.297.300. PMID: 24783818.

12 Martínez-González MA, López-Fontana C, Varo JJ, et al. Validation of the Spanish version of the physical activity questionnaire used in the Nurses' Health Study and the Health Professionals' Follow-up Study. *Public Health Nutr.* 2005;8:920-7. DOI: 10.1079/phn2005745. PMID: 16277809.

13 Camões M, Severo M, Santos AC, et al. Testing an adaptation of the EPIC physical activity questionnaire in Portuguese adults: a validation

study that assesses the seasonal bias of self-report. *Ann Hum Biol*. 2010;37:186-98. DOI: 10.3109/03014460903341836. PMID: 19961349.
14 Masoumi SJ, Khademolhosseini F, Mehrabani D, et al. Correlation Of Quality Of Life With Gastroesophageal Reflux Disease Amongst Qashqai Nomads In Iran. *Arch Iran Med.* 2012;15:47-50. PMID: 23199245.
15 Neilson HK, Robson PJ, Friedenreich CM, Csizmadi I. Estimating activity energy expenditure: how valid are physical activity questionnaires? *Am J Clin Nutr.* 2008;87:279-91. DOI: 10.1093/ajcn/87.2.279. PMID: 18258615.
16 International Physical Activity Questionnaire 2009. Available from: http://www.ipaq.ki.se/ipaq.htm.
17 Thuy AB, Blizzard L, Schmidt M, Luc PH, Magnussen C, Dwyer T. Reliability and validity of the global physical activity questionnaire in Vietnam. *J Phys Act Health*. 2010;7:410-8. DOI: 10.1123/jpah.7.3.410. PMID: 20551499.
18 Kannel WB, Sorlie P. Some health benefits of physical activity: the Framingham Study. *Arch Intern Med*. 1979;139:857-61. PMID: 464698.
19 Baecke JA, Burema J, Frijters JE. A short questionnaire for the measurement of habitual physical activity in epidemiological studies. *Am J Clin Nutr.* 1982;36:936-42. DOI: 10.1093/ajcn/36.5.936. PMID: 7137077.
20 Taylor HL, Jacobs Jr DR, Schucker B, Knudsen J, Leon AS, Debacker G. A questionnaire for the assessment of leisure time physical activities. *J Chronic Dis*. 1978;31:741-55. DOI: 10.1016/0021-9681(78)90058-9. PMID: 748370.
21 Jurj AL, Wen W, Xiang YB, et al. Reproducibility and validity of the Shanghai Men's Health Study physical activity questionnaire. *Am J Epidemiol*. 2007;165:1124-33. DOI: 10.1093/aje/kwk119. PMID: 17351289.
22 Momenan AA, Delshad M, Sarbazi N, et al. Reliability and validity of the Modifiable Activity Questionnaire (MAQ) in an Iranian urban adult population. Arch Iran Med. 2012;15:279-82. PMID: 22519376.
23 Delshad M, Ghanbarian A, Ghaleh NR, et al. Reliability and validity of the modifiable activity questionnaire for an Iranian urban adolescent population. *Int J Prev Med.* 2015;6:3. DOI: 10.4103/2008-7802.151433. PMID: 25789138.
24 Manshadi FD, Azimi H, Montazeri A, Sadeghisani M. Validity and Reliability of the Persian Version of Baecke Habitual Physical Activity Questionnaire in Healthy Subjects. *Asian J Sports Med*. 2016;7:e31778. DOI: 10.5812/asjsm.31778. PMID: 27826396.
25 James WPT, Schofield EC. Human energy requirements. A manual for planners and nutritionists: Oxford University Press; 1990.
26 Bolton-Smith C, Woodward M, Tunstall-Pedoe H. The Scottish Heart Health Study. Dietary intake by food frequency questionnaire and odds ratios for coronary heart disease risk. II. The antioxidant vitamins and fibre. *Eur J Clin Nutr.* 1992;46:85-93. PMID: 1313760.
27 Joint F. Energy and protein requirements: Report of a joint FAO/WHO/UNU Expert Consultation. Technical Report Series (WHO): World Health Organization; 1985.
28 Zeraati M, Alavi NM. Designing and validity evaluation of quality of nursing care scale in intensive care units. *J Nurs Meas.* 2014;22:461-71. DOI: 10.1891/1061-3749.22.3.461.PMID: 25608432.
29 Lawshe CH. A quantitative approach to content validity. *Personnel psychol*. 1975;28:563-75. DOI:10.1111/j.1744-6570.1975.tb01393.x.
30 Boon RM, Hamlin MJ, Steel GD, et al. Validation of the New Zealand physical activity questionnaire (NZPAQ-LF) and the international physical activity questionnaire (IPAQ-LF) with accelerometry. *Br J Sports Med*. 2010;44:741-6. DOI: 10.1136/bjsm.2008.052167. PMID: 18981036
31 Questionnaire IPA. 2009.
32 Kritz-Silverstein D, Barrett-Connor E, Corbeau C. Cross-sectional and prospective study of exercise and depressed mood in the elderly: the Rancho Bernardo study. *Am J Epidemiol.* 2001;153:596-603. DOI: 10.1093/aje/153.6.596. PMID: 11257068.
33 Lee IM. Physical activity and cancer prevention--data from epidemiologic studies. *Med Sci Sports Exerc*. 2003;35:1823-7. DOI: 10.1249/01.MSS.0000093620.27893.23. PMID: 14600545.
34 Manson JE, Stampfer M, Colditz G, et al. Physical activity and incidence of non-insulin-dependent diabetes mellitus in women. *Lancet.* 1991;338:774-8. DOI: 10.1016/0140-6736(91)90664-b. PMID: 1681160.
35 Warburton DE, Nicol CW, Bredin SS. Health benefits of physical activity: the evidence. *CMAJ.* 2006;174:801-9. DOI: 10.1503/cmaj.051351. PMID: 16534088.
36 Gholami Fesharaki M, AzadMarzabadi E. Evaluation of the reliability and validity of Azad-Fesharaki's physical activity questionnaire (AFPAQ). *J Arak Univ Med Sci*. 2011;14:36-44.
37 Pereira M, FitzerGerald S, Gregg E. A collection of physical activity questionnaires for health-related research. Kriska and Caspersen, Eds.

Centers for Disease Control and Prevention. *Med Sci Sports Exerc*. 1997;29:S1-205.

38 Craig CL, Marshall AL, Sjöström M, et al. International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc*. 2003;35:1381-95. DOI: 10.1249/01.MSS.0000078924.61453.FB. PMID: 12900694.

39 Trinh OT, Do Nguyen N, Van Der Ploeg HP, Dibley MJ, Bauman A. Test-retest repeatability and relative validity of the Global Physical Activity Questionnaire in a developing country context. *J Phys Act Health*. 2009;6:S46-S53. DOI: 10.1123/jpah.6.s1.s46. PMID: 19998849.

40 Ono R, Hirata S, Yamada M, et al. Reliability and validity of the Baecke physical activity questionnaire in adult women with hip disorders. *BMC Musculoskelet Disord*. 2007;8:61. DOI: 10.1186/1471-2474-8-61. PMID: 17610746.