

RELIABILITY OF THE CROATIAN LONG VERSION OF THE INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

Željko Pedišić^{1,2}, Danijel Jurakić¹, Marija Rakovac¹, Dinko Hodak³ and Dražan Dizdar¹

¹Faculty of Kinesiology, University of Zagreb, Croatia

²Institute of Sport Science, Karl-Franzens-University of Graz, Austria

³Zagreb Student Centre, Croatia

Original scientific paper
UDC 303.6:796.012.1(497.5)

Abstract:

Studies have shown satisfactory reliability of different language versions of the *International Physical Activity Questionnaire* (IPAQ). However, to the best of our knowledge, no previous study reported data on reliability of the Croatian version of IPAQ. Therefore, the aim of this study was to determine test-retest reliability of IPAQ in Croatia. We assessed physical activity levels using the Croatian long version of IPAQ in a random stratified sample of 122 Croatian adults (60.1% female) aged 15 to 65 years and in a random stratified sample of 133 university students (61.1% female) living in student dormitories in Zagreb. IPAQ was administered on two occasions, 3-4 and 1-2 weeks apart, in the general population and university students, respectively. Spearman's rank correlation coefficients between test and retest data for domain-specific and intensity-specific physical activity levels ranged between .45 and .77 in the general population, and between .49 and .59 in university students. To conclude, the Croatian long version of IPAQ showed satisfactory reliability for measuring domain-specific and intensity-specific physical activity levels. Nevertheless, a significant amount of unsystematic error in the IPAQ results should always be considered when interpreting the results in relational studies.

Key words: energy expenditure, motor activity, repeatability, long IPAQ, IPAQ long form

Introduction

Insufficient physical activity is considered to be one of the major public health problems of modern times. Therefore, the level of physical activity, as well as its determinants and consequences are studied worldwide in different general and specific populations. During the years 1998 and 1999, in order to allow comparisons of physical activity data gathered in different surveys, a group of internationally recognized experts in the field of physical activity epidemiology – International Consensus Group, developed the *International Physical Activity Questionnaire* (IPAQ) (Craig, et al., 2003). Since then, IPAQ has been used in a large number of surveys all around the globe and is nowadays available in many languages. Perhaps the best examples of international recognition and importance of IPAQ are its applications in large-scale surveys like EUPASS (Rütten, et al., 2003), Eurobarometer 58.2 (Sjöström, Oja, Hagströmer, Smith, & Bauman, 2006), and Eurobarometer 64.3 (Abu-Omar & Rütten, 2008).

For the purpose of physical activity assessment in Croatia in 2007, IPAQ was officially translated

and culturally adapted by two of the authors of this study (DJ and ŽP). Since then the official Croatian long version of IPAQ has been used in different surveys such as: Health-Enhancing Physical Activity in the Croatian General Population (HEPA-C) (Jurakić, Pedišić, & Andrijašević, 2009; Jurakić, Pedisic, & Greblo, 2010), Health-Enhancing Physical Activity in Middle-Aged Employees in Croatia (HEPA-MAEC) (Jurakić, Andrijašević, & Pedišić, 2010), and Physically Active Students (C-PAS).

The process of translation and cultural adaptation of IPAQ is standardized and well defined. However, any changes made to the original language version might cause slight semantic differences in questions and instructions, which could directly affect the reliability and validity of the questionnaire. Although Craig et al. (2003) reported the international reliability of IPAQ, based on the results from 12 countries, Croatia was not included in that study (Craig, et al., 2003). To the best of our knowledge, no other study reported data on the reliability of the Croatian version of IPAQ. Therefore, the aim of this study was to determine the test-retest reliability of the Croatian long version of IPAQ.

Methods

Subjects

Data were gathered within two separate surveys – HEPA-C and C-PAS, conducted in 2007 and 2009, respectively. Within the HEPA-C survey we assessed the physical activity level in a random stratified sample of 1,076 Croatian adults aged 15 to 65 years, where stratification was performed by geographical region and settlement size. Subjects were interviewed face-to-face in their households. For the purpose of this study we used the subsample of 122 participants (60.1% female) from the HEPA-C survey, i.e. the subsample of all the participants who gave their consent to be interviewed on the second occasion. The second interviews were conducted 3-4 weeks after the first ones. We have chosen this period between test and retest in accordance with previous studies (Pedišić, Vranešić-Bender, & Mišigoj-Duraković, 2008) under the assumption that it is a long enough period for the participants to forget what they had written in the first survey, but a too short one for any substantial changes in physical activity to occur. Detailed description of the sample design and data assessment can be found elsewhere (Jurakić, Pedišić, & Andrijašević, 2009).

Within the C-PAS survey we conducted a self-administered questionnaire survey in a random

stratified sample of 1,750 university students living in student dormitories in Zagreb. The stratification was performed according to gender and student dormitory (5 student dormitories in Zagreb). In the second week of June, 2009, all selected university students received the official invitation to participate in the survey mailed by the Zagreb Student Centre. Surveys took place in the common room in each dormitory. One week later, students who did not respond to the first invitation, received the second one. Interviewers directly approached the students who did not respond even to the second invitation, so they filled out the questionnaires in their own dormitory rooms. The response rate was 71.7%. Since 7.3% students were excluded from further analysis on account of invalid or incomplete data, the final sample consisted of 1,163 participants. For the purpose of this study, we used the subsample of 133 participants (61.1% female) from the C-PAS survey, i.e. the subsample of all the participants who agreed to participate in the second survey. The second survey on the university students took place 1-2 weeks after the first one. We assumed that this period between test and retest might be too short for the participants to completely forget what they had written in the first survey. However, due to the university timetable both surveys had to be completed before the end of June. On the second

Table 1. Sample characteristics

Variable / category	Mean±SD / percent*	
	General population	University students
Age (yrs)	42.58 ± 12.15	21.35 ± 1.65
Body mass index (kg/m ²)	25.14 ± 4.26	22.17 ± 2.86
< 16.5	0.0	0.8
16.5 - 18.5	1.7	6.8
18.5 - 25	57.9	76.7
25 - 30	27.3	14.3
> 30	13.2	1.5
Monthly income/budget (€)†	494 ± 314	194 ± 91
Size of settlement (number of inhabitants)‡		
< 2,000	32.0	27.3
2,001 – 10,000	14.8	30.3
10,001 – 100,000	20.5	32.6
> 100,000	32.8	9.8
Smoking habit		
never smoked	45.9	75.9
quit smoking	13.1	4.5
smoking < 10 cigarettes/day	9.8	11.3
smoking 10 - 20 cigarettes/day	19.7	7.5
smoking > 20 cigarettes/day	11.5	0.8

* Data are presented as mean±standard deviation for quantitative variables, i.e. as percentage of participants in different categories for categorical variables.

† Personal monthly income for the general population, i.e. personal monthly budget for university students.

‡ Number of inhabitants in the current place of residence for the general population, i.e. in the town/city the university student originates from.

occasion, all the students were approached directly by interviewers and filled out the questionnaire in their own rooms.

Participation in both surveys was voluntary. Data on demographics and lifestyle characteristics of subjects in both samples are presented in Table 1. The study protocol was approved by the Scientific and Ethics Committee of the Faculty of Kinesiology, University of Zagreb.

Measures

In this study the long version of IPAQ, with the 'last 7 days' reference period, was used. The long version of IPAQ assesses total physical activity level and it separates physical activity levels in four domains (work, transport, domestic & garden, and leisure-time) and sedentary time. Energy expenditure in a specific activity category (e.g. moderate-intensity leisure-time physical activity) was calculated by multiplying weekly frequency, usual duration and metabolic equivalent of the respective activity category. The long version of IPAQ estimates energy expenditure for 11 separate activity categories: 1) walking at work, 2) moderate-intensity physical activity at work, 3) vigorous-intensity physical activity at work, 4) walking for transportation, 5) cycling for transportation, 6) moderate-intensity garden/yard chores, 7) vigorous-intensity garden/yard chores, 8) moderate-intensity inside chores, 9) walking in leisure time, 10) moderate-intensity leisure-time physical activity, and 11) vigorous-intensity leisure-time physical activity. Physical activity scores computed for different categories are summed up to estimate the energy expenditure within the specific domain. The sum of different intensity physical activities in the specific domain represents the total physical activity for that domain (e.g. the sum of energy expended in walking at work, moderate-intensity physical activity at work, and vigorous-intensity physical activity at work represents the total physical activity score in work domain). The sum of the scores for specific intensity activities across different domains represents the total intensity-specific physical activity score (e.g. the sum of energy expended in vigorous-intensity activity at work and vigorous-intensity leisure-time activity represents the total vigorous-intensity physical activity score). The sum of the physical activity scores in all categories, i.e. in all domains, represents the estimation of the total physical activity. Physical activity scores are expressed in relative energy expenditure units – MET hour/week. Detailed description of the questionnaire and guidelines for computation of energy expenditure of participants can be found in the official Guidelines for Data Processing and Analysis of IPAQ (IPAQ, 2005).

A separate set of questions was used to collect data on gender, age, body height, body weight, size

of settlement, personal income/personal monthly budget, and cigarette consumption. According to the self-reported body weight and body height, we calculated body mass index ($BMI = \text{weight}/\text{height}^2$ [kg/m²]).

Data analyses

Data on demographic and lifestyle characteristics are presented as mean \pm standard deviation, i.e. as percentage of participants in different categories. Physical activity levels in test and retest are presented as median \pm quartile range, where 95% confidence limits for medians were calculated according to Bonett and Price (2002). Since the assessed physical activity levels were positively skewed, we evaluated their test-retest reliability by Spearman's rank correlation coefficients and respective 95% confidence intervals. All data were analyzed separately for the subjects from the general population and for the university students by using STATISTICA, version 8.0 (StatSoft, Inc., Tulsa, OK, USA).

Results

Spearman's rank correlation coefficients between test and retest data in the general population ranged from .45 to .77 (Table 2), with the lowest reliability determined for transport-related physical activity and the highest for work-related physical activity. Test-retest reliability in university students ranged between .49 for work-related physical activity and .59 for physical activity in transport domain. Reliability of the total physical activity level estimated with the Croatian version of IPAQ was .64 and .52 in the general population and university students, respectively. Spearman's rank correlations calculated in the samples of 122 subjects from the general population and 133 university students allowed us to make rather precise estimates of the reliability in the respective populations. Namely, based on the 95% confidence intervals, we should not expect the reliability of domain-specific or intensity-specific physical activity levels in future studies to be lower than .29 or higher than .84 in the Croatian general population, i.e. it should not be lower than .34 or higher than .69 in the Croatian university students. However, it is important to mention that the previously mentioned limits are generalizable only to studies which follow the methodological principles of data assessment and processing used in this study.

Descriptive comparisons of medians in test and retest showed a slight decrease in estimated physical activity level at the second assessment. However, the overlap of the 95% confidence intervals of all respective medians points out that the obtained differences between test and retest were not significant ($p > .05$).

Table 2. Test-retest reliability of the Croatian long version of the International Physical Activity Questionnaire

Physical activity domain/intensity	General population			University students		
	$\mu_e \pm Q^* (95\% CI)^\dagger$		Spearman r	$\mu_e \pm Q^* (95\% CI)^\dagger$		Spearman r
	Test	Retest		Test	Retest	
Work	0.00 ± 46.20 (-2.80 – 2.80)	0.00 ± 48.00 (-2.82 – 2.82)	.77 (.69 – .84)	0.00 ± 0.00 (0.00 – 0.00)	0.00 ± 0.00 (0.00 – 0.00)	.49 (.34 – .61)
Transport	3.99 ± 13.48 (2.18 – 5.80)	4.13 ± 11.55 (2.68 – 5.57)	.48 (.33 – .61)	14.55 ± 18.15 (10.91 – 18.19)	11.55 ± 16.50 (9.20 – 13.90)	.59 (.47 – .69)
Domestic & garden	17.42 ± 39.00 (13.43 – 21.41)	13.50 ± 26.00 (9.51 – 17.49)	.67 (.56 – .76)	9.00 ± 19.00 (5.45 – 12.55)	7.00 ± 15.75 (4.67 – 9.33)	.57 (.44 – .67)
Leisure-time	6.60 ± 18.70 (4.28 – 8.92)	6.19 ± 16.00 (3.09 – 9.29)	.54 (.40 – .66)	16.25 ± 31.05 (11.06 – 21.44)	12.00 ± 21.20 (7.58 – 16.42)	.56 (.44 – .67)
Walking	13.20 ± 30.53 (10.49 – 15.91)	11.55 ± 24.75 (7.29 – 15.81)	.60 (.47 – .70)	19.80 ± 27.50 (16.03 – 23.57)	18.15 ± 24.20 (13.57 – 22.73)	.57 (.45 – .68)
Moderate	29.75 ± 56.00 (20.95 – 38.55)	21.00 ± 41.67 (14.66 – 27.34)	.63 (.51 – .73)	16.00 ± 29.50 (12.82 – 19.18)	12.00 ± 23.50 (7.10 – 16.90)	.53 (.39 – .64)
Vigorous	0.00 ± 8.00 (0.00 – 0.00)	0.00 ± 8.00 (0.00 – 0.00)	.45 (.29 – .58)	6.00 ± 24.00 (0.12 – 11.88)	0.00 ± 16.00 (-1.96 – 1.96)	.57 (.45 – .68)
Total	67.55 ± 121.58 (51.55 – 83.54)	54.32 ± 87.60 (43.33 – 65.31)	.64 (.52 – .74)	55.20 ± 72.23 (45.03 – 65.37)	45.65 ± 48.43 (37.76 – 53.54)	.52 (.39 – .64)

* Median±quartile range (MET-hour/week)

† 95% confidence interval for median

Discussion and conclusions

Craig et al. (2003) concluded that the long version of IPAQ had very good test-retest reliability, based on the Spearman's correlation coefficients, which clustered around .80. The present study found a somewhat lower reliability, both for the general population and for university students. However, the test-retest reliability of the Croatian long version of IPAQ both in the general population and in university students can be considered satisfactory when compared to different language versions of the questionnaire (Craig, et al., 2003; Levy & Readdy, 2009; Macfarlane, Chan, & Cerin, 2010; Roman-Viñas, et al., 2010; Saglam, et al., 2010). Namely, moderate to high reliability was found for overall physical activity level, as well as for domain/intensity-specific physical activity levels. It is important to mention that the samples used in this study were large enough to assure the calculation of relatively narrow confidence intervals, allowing us to draw the trustworthy conclusions on the reliability of IPAQ in the respective populations.

The reliability determined in the Croatian general population was within the wide range of reliability values reported in other countries, i.e. .38-.96 (Craig, et al., 2003); .74-.97 (Macfarlane, Chan, & Cerin, 2010); .73-.92 (Roman-Viñas, et al., 2010). As expected, the reliability of total physical activity in the sample from the Croatian general population was somewhat lower than the reliability in most other countries (Craig, et al., 2003). Because in this subsample we used a longer interval between test and retest than the other researchers (3-4 weeks vs. 3-7 days), real changes in the total physical

activity of our participants were more likely to occur. Since any change in physical activity level of participants between test and retest can decrease the estimates of the actual reliability, this could be a possible explanation of a lower reliability determined in the Croatian general population. We assume that changes in total physical activity were mostly affected by fluctuations in leisure-time and transport-related physical activity over the test-retest period. This assumption is supported by a lower reliability determined in these domains than in work and domestic domains. We assume that in Croatia, work and domestic physical activities are less optional than leisure-time and transport-related physical activities, i.e. that they are part of a more constant daily/weekly routine. Based on the previously mentioned, it is possible to assume that the energy expenditure in these domains is more stable over time compared to leisure-time and transport domain. The previously mentioned is a possible explanation of a higher test-retest reliability found precisely for work-related and domestic physical activity.

The satisfactory reliability of the Croatian version of IPAQ determined in university students is also congruent with the results of previous studies (Levy & Readdy, 2009; Saglam, et al., 2010). Reliability coefficients for physical activity in different domains and different intensities varied less in university students than in the general population. A somewhat lower reliability determined for work-related physical activity is in line with our expectations. Namely, we assumed that most of the students did not have a steady job, but did contract

or temporary work. Since IPAQ assesses physical activity within the previous 7 days, it is possible that a certain number of participants interrupted a contract job in the period between the first and the second assessment, or started a new job that they were not engaged in at the time of the first measurement, or even that they changed a job. Each of the mentioned possibilities could easily have changed the level of their work-related physical activity, and consequently reduced the test-retest reliability. The first two possibilities were explored by examination of the differences between each participant's test and retest answers to the question: '*Do you currently have a job or do any unpaid work outside your home?*'. It was thus determined that in the period of 7 to 14 days between the two interviews 6.3% had either interrupted or started a job. Since this percentage could, at first glance, seem negligible, it should be emphasized that, due to the extremely low variability of the students' work-related physical activity, even a small number of participants changing their activity level between the first and the second interview might have significantly decreased the reliability. Namely, the estimated physical activity score in work domain for as high as 85.0% of students in the first, and 85.7% of students in the second interview was 0. Given the fact that in case the participants' results did not vary, the reliability would be 0, we can easily conclude that the low variability of the students' work-related physical activity has, by itself, contributed to the low reliability. Based on everything mentioned previously, two questions arise: *Is test-retest interview a justifiable method for determining the reliability of work-related physical activity level in students?* and *What is the actual reliability of IPAQ in estimation of work-related physical activity in students?* We can assume that the test-retest reliability of the students' work-related physical activity would be very similar to the reliability determined in the general population, in case the students' work/job characteristics were more stable over time. Furthermore, a possible reason for the higher reliability of physi-

cal activity in leisure-time, transport, and domestic domains is the participants' easier recall of activities performed regularly, i.e. the ones that are part of their daily or weekly routine.

Although the differences between the test and retest medians did not reach the level of statistical significance, what is indicative is that a decline was found in almost all physical activity domains and intensities, as well as in total physical activity level, both for the general population and for university students. This could suggest the presence of assessment/time-related systematic error in the physical activity estimation using IPAQ. However, based on the results of our study, it would not be justified to draw final conclusions on assessment/time-related systematic error of IPAQ. Therefore, it would be interesting to investigate this problem more specifically and more in detail in future studies.

The major limitation of this study was that, due to limited resources, we did not evaluate the reliability of the IPAQ-short form and the IPAQ versions with a 'usual week' reference period. Secondly, we did not evaluate all standard modes of IPAQ administration. Namely, we used only face-to-face interviews and self-administered questionnaires, but not telephone interviews. Thirdly, we did not use the same time period between the two administrations of the questionnaire in both samples, which would have allowed us to make more trustworthy comparisons of reliability of the questionnaire in respective populations.

To conclude, the Croatian long version of IPAQ is a reliable questionnaire for measuring domain-specific and intensity-specific physical activity levels. However, the reliability is still far from perfect. The significant amount of unsystematic error in the IPAQ results should always be considered when interpreting the results in relational studies. In addition, the results of this study indicate the presence of assessment/time-related systematic error of IPAQ. Possible existence of this type of error should be considered when interpreting longitudinal changes in physical activity.

Acknowledgements

This study is part of two independent research projects – *Health-Enhancing Physical Activity in the Croatian General Population* (HEPA-C) and *Physically Active Students* (C-PAS). The authors are very grateful to Zrinka Greblo, Ph.D. and the Zagreb Student Centre for their generous support. Special thanks to Nevenka Hendrih, Marijana Plovanić and all employees of Henda for assistance in data collection.

References

- Abu-Omar, K., & Rütten, A. (2008). Relation of leisure time, occupational, domestic, and commuting physical activity to health indicators in Europe. *Preventive Medicine, 47*(3), 319–323.
- Bonett, D.G., & Price, R.M. (2002). Statistical inference for a linear function of medians: Confidence intervals, hypothesis testing and sample size requirements. *Psychological methods, 7*(3), 370–383.
- Craig, C.L., Marshall, A.L., Sjöström, M., Bauman, A.E., Booth, M.L., Ainsworth, B.E., et al. (2003). International Physical Activity Questionnaire: 12-country reliability and validity. *Medicine & Science in Sports & Exercise, 35*(8), 1381–1395.
- International Physical Activity Questionnaire (IPAQ). (2005). IPAQ – Scoring Protocol. Retrieved April 1, 2008 from: <http://www.ipaq.ki.se/scoring.pdf>
- Jurakić, D., Andrijašević, M., & Pedišić, Ž. (2010). Osnove strategije za unapređenje tjelesne aktivnosti i zdravlja zaposlenika srednje dobi s obzirom na obilježja radnoga mjesta i sklonosti ka sportsko-rekreacijskim aktivnostima. [Assessment of workplace characteristics and physical activity preferences as integral part in development of physical activity promotion strategies for middle-aged employees. In Croatian.] *Sociologija i prostor, 48*(1), 113–131.
- Jurakić, D., Pedišić, Ž., & Andrijašević, M. (2009). Physical activity of Croatian population: Cross-sectional study using International Physical Activity Questionnaire. *Croatian Medical Journal, 50*(2), 165–173.
- Jurakic, D., Pedisic, Z., & Greblo, Z. (2010). Physical activity in different domains and health-related quality of life: A population-based study. *Quality of Life Research, 19*(9), 1303–1309.
- Levy, S.S., & Readdy, R.T. (2009). Reliability of the international physical activity questionnaire in research settings: Last 7-day self-administered long form. *Measurement in Physical Education and Exercise Science, 13*(4), 191–205.
- Macfarlane, D., Chan, A., & Cerin, E. (2010). Examining the validity and reliability of the Chinese version of the international physical activity questionnaire, long form (IPAQ-LC). *Public Health Nutrition, 1*–8. [Epub ahead of print]
- Pedišić, Ž., Vranešić-Bender, D., Mišigoj-Duraković, M. (2008). Construction and reproducibility of a questionnaire aimed for evaluation of dietary habits in physically active individuals. *Collegium Antropologicum, 32*(4), 1069–1107.
- Roman-Viñas, B., Serra-Majem, L., Hagströmer, M., Ribas-Barba, L., Sjöström, M., & Segura-Cardona, R. (2010). International Physical Activity Questionnaire: Reliability and validity in a Spanish population. *European Journal of Sport Science, 10*(5), 297–304.
- Rütten, A., Vuillemin, A., Ooijendijk, W., Schena, F., Sjöström, M., Stahl, T., et al. (2003). Physical activity monitoring in Europe. The European Physical Activity Surveillance System (EUPASS) approach and indicator testing. *Public Health Nutrition, 6*(4), 377–384.
- Saglam, M., Arikan, H., Savci, S., Inal-Ince, D., Bosnak-Guclu, M., Karabulut, E., et al. (2010). International Physical Activity Questionnaire: Reliability and validity of the Turkish version. *Perceptual and Motor Skills, 111*(1), 278–284.
- Sjöström, M., Oja, P., Hagströmer, M., Smith, B.J., & Bauman, A. (2006). Health enhancing physical activity across European Union countries: The Eurobarometer study. *Journal of Public Health, 14*(5), 291–300.

Submitted: October 5, 2011

Accepted: December 25, 2011

Correspondence to:

Željko Pedišić, M.Ed., Ph.D.

Faculty of Kinesiology, University of Zagreb

Horvačanski zavoj 15

HR-10000, Zagreb, Croatia

Phone: +385 1 3658 732

Fax: +385 1 3658 654

E-mail: zeljko.pedisic@kif.hr

POUZDANOST HRVATSKE VERZIJE UPITNIKA *INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (IPAQ) – LONG FORM*

Dosadašnja su istraživanja pokazala zadovoljavajuću pouzdanost upitnika *International Physical Activity Questionnaire (IPAQ)* prevedenoga na različite jezike. Prema saznanjima autora, do sada ni u jednom istraživanju nisu prikazani podaci o pouzdanosti hrvatske verzije IPAQ-a. Stoga je cilj ovoga istraživanja bio utvrditi test-retest pouzdanost IPAQ-a u Hrvatskoj. Dugačkom verzijom IPAQ-a na hrvatskom jeziku procijenjena je razina tjelesne aktivnosti na slučajnom stratificiranom uzorku od 122 odrasla stanovnika Hrvatske iz opće populacije, u dobi od 15 do 65 godina (od čega 60,1% žena) te na slučajnom stratificiranom uzorku od 133 studenata, stanara studentskih domova u Zagrebu (61,1% ženskoga spola). Anketiranje je provedeno u dva navrata, pri čemu su između prvoga i ponovljenoga anketiranja u općoj populaciji prošla 3-4 tjedna, a

između dva anketiranja u populaciji studenata tjedan do dva. Spearmanovi koeficijenti rang korelacije između razina tjelesne aktivnosti u različitim domenama i različitoga intenziteta, utvrđeni u testu i retestu, kretali su se između 0,45 i 0,77 u općoj populaciji, odnosno između 0,49 i 0,59 u studenata. Hrvatska verzija IPAQ-a pokazala je zadovoljavajuću pouzdanost u procjeni razina tjelesne aktivnosti. Unatoč tome, prilikom interpretacije rezultata u relacijskim istraživanjima potrebno je voditi računa o nesistematskoj pogrešci IPAQ-a, čija se razina ne može smatrati zanemarivom.

Ključne riječi: *utrošak energije, motorička aktivnost, test-retest pouzdanost, duga verzija IPAQ-a, dugačka inačica IPAQ-a*