

ORIGINAL ARTICLE: EPIDEMIOLOGY,  
CLINICAL PRACTICE AND HEALTH**Cross-cultural adaptation and psychometric study of the Turkish version of the Rapid Assessment of Physical Activity**Fatma Kübra Çekok,<sup>1</sup> Turhan Kahraman,<sup>2</sup> Muhammet Kalkışım,<sup>3</sup> Arzu Genç<sup>2</sup> and Pembe Keskinöğlü<sup>4</sup><sup>1</sup>Department of Physical Therapy and Rehabilitation, Medical Park Hospital, and <sup>2</sup>School of Physical Therapy and Rehabilitation, <sup>3</sup>Health Sciences Institute, and <sup>4</sup>Department of Biostatistics and Medical Informatics, Dokuz Eylül University, İzmir, Turkey

**Aim:** The Rapid Assessment of Physical Activity (RAPA) is a valid tool for use in clinical practice to provide an easily administered and interpreted means of assessing levels of physical activity among adults older than 50 years. However, there are some concerns about its reliability. The aim was to linguistically and culturally adapt the RAPA into Turkish, and assess its validity and reliability.

**Methods:** This methodological and cross-sectional study included 110 participants (68 women) from the community and a nursing home. The RAPA was translated and culturally adapted into Turkish using established double-back translation methods. The participants completed the RAPA twice with a 1-week interval to examine test–retest reliability. The International Physical Activity Questionnaire-Short Form and Physical Activity Scale for the Elderly were used to examine the validity.

**Results:** The mean age of the participants was 70.5 years (SD 10.5 years). The weighted kappa coefficients exceed 0.81 for each of the nine items, the aerobic score and strength and flexibility score, showing that the test–retest reliability was very good. There were positive moderate correlations between the RAPA, International Physical Activity Questionnaire-Short Form and Physical Activity Scale for the Elderly ( $P < 0.01$ ). Additionally, the RAPA was negatively correlated with the International Physical Activity Questionnaire-Short Form sitting time as prehypoththesized ( $P < 0.01$ ). The convergent and discriminate validity of the RAPA were acceptable.

**Conclusions:** The present study has shown that the Turkish version of the RAPA was an easy-to-use, valid and reliable measure of physical activity among adults aged older than 50 years. This study has also provided considerable evidence about the test–retest reliability of the RAPA, which was not investigated in the original validation study. **Geriatr Gerontol Int 2017; 17: 1837–1842.**

**Keywords:** physical activity, rapid assessment, reliability, Turkey, validity.

**Introduction**

Physical activity is defined as any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a basal level of an individual.<sup>1</sup> Physical inactivity is a worldwide problem, and one of the highest risk factors for mortality.<sup>2</sup> It is a risk factor for several disorders, such as cardiovascular diseases, metabolic disorders and some cancer types leading to impairment, disability or death.<sup>2</sup> The level of physical activity is an important outcome for evaluating the efficacy of pharmaceutical and/or rehabilitative interventions in clinical

and epidemiological studies.<sup>1</sup> Because of the importance of physical activity, it is crucial to have a good measure for physical activity.

Physical activity questionnaires have been used for decades to increase our understanding of the individual, social and environmental factors that facilitate or impede physical activity in daily life and guide public health recommendations.<sup>3</sup> There are several physical activity questionnaires have been validated for older adults, such as the Patient-Centered Assessment and Counseling for Exercise,<sup>4</sup> Behavioral Risk Factor Surveillance System questionnaire,<sup>5</sup> and Rapid Assessment of Physical Activity (RAPA).<sup>6</sup> The RAPA stands from these questionnaires, because it has better sensitivity, specificity and negative/positive predictive value.<sup>6</sup> Another advantage of the RAPA is the assessment of the strength and flexibility training habits, which are important for decreasing the fall risk and maintaining an independent life among older

Accepted for publication 17 October 2016.

Correspondence: Mr Turhan Kahraman, MSc, Dokuz Eylül University, School of Physical Therapy and Rehabilitation, İzmir, Turkey, TR 35340. Email: turhan.kahraman@yahoo.com

adults.<sup>6</sup> Additionally, the RAPA is very easy-to-use and readable at the 6th grade reading level.<sup>6</sup>

The RAPA is a valid measure of physical activity and it has been used in many clinical studies for more than 10 years. However, there are some concerns about its test-retest reliability, which it was not investigated in the original validation study.<sup>6</sup> The aims of the present study were to culturally adapt the RAPA for use in Turkey,<sup>1</sup> and to investigate the validity and reliability of this adapted version.<sup>2</sup>

## Methods

### Participants

Adults aged older than 50 years from the community and a nursing home participated in the present methodological and cross-sectional study. Only self-mobilized participants aged older than 50 years were included in the study. The exclusion criteria were having a Mini-Mental State Examination score <22 for educated participants and <18 for uneducated participants,<sup>7</sup> severe chronic disease, severe cognitive impairment, and surgery within the past 6 months. The study was approved by the ethics committee of Dokuz Eylül University (registration number: 1959-GOA), and all participants provided informed consent before participating in the study.

In a validation study, it is advised that the required sample size should be at least 10 times of the number of items of a scale.<sup>8</sup> Because the RAPA has nine items, the required sample size was determined as 90 participants. However, to increase the power of the study, we increased the number by approximately 20%, and the required sample size was determined as 110 participants.

### Translation and cross-cultural adaptation

The translation and cross-cultural adaptation process was carried out in accordance with the published guidelines.<sup>9</sup> The permission for translation and cross-cultural adaptation of the RAPA into Turkish was obtained from the developer of the original RAPA.<sup>6</sup> The double-back translation method was carried out by a professional translation services company. After the double-back translation process, both translations and the original version were analyzed by the researchers. Some graphics and physical activities were changed or deleted, and the pre-final version was designed. The pre-final version was sent to the developer of the original RAPA, and her approval was obtained.

Five older adults were invited to fill out the pre-final version of the RAPA for cognitive debriefing. After the interview with the participants with regard to the wording, terminology, instructions and clarity of the response options, the pre-final version was accepted, as it was ready to use.

### Validity and reliability

The participants completed a questionnaire about the demographic characteristics, the RAPA and the other physical activity questionnaires including the Physical Activity Scale for the Elderly (PASE) and the International Physical Activity Questionnaire-Short Form (IPAQ-SF). The questionnaires were carried out in a random order to avoid an order effect. The participants were asked to complete the RAPA after an interval of 1 week, to assess its test-retest reliability.

### Instruments

#### RAPA

The RAPA is a self-reported physical activity measure that was originally developed in English in Washington, USA.<sup>6</sup> It has nine items that have a dichotomous response option (i.e. “yes” or “no”). The items ask about different levels of physical activity, as well as strength and flexibility training.<sup>6</sup> In the instruction part of the RAPA, three levels of physical activity (light, moderate and vigorous) are briefly described with graphics and texts. To score the first part of the RAPA (i.e. RAPA 1), the question with the highest score with a “yes” response is chosen from the first seven items. The RAPA 1 score categorized the respondent into one of five levels of physical activity. These levels of physical activity are described as sedentary (item 1),<sup>1</sup> underactive (item 2),<sup>2</sup> regular underactive (light activities; item 3),<sup>3</sup> regular underactive (items 4 and 5)<sup>4</sup> and regular active (items 6 and 7).<sup>5</sup> The cut-off point of the RAPA is 6 (i.e. any number less than 6 is considered as a suboptimal level of physical activity). The 6 or 7 score put the respondent into the regular active category of the RAPA, which means that person has an adequate level of health-enhancing physical activity. The second part of the RAPA (i.e. RAPA 2), which asks about the strength and flexibility training, is scored separately. The RAPA 2 is reported as (0) doing neither strength nor flexibility training,<sup>1</sup> doing strength training,<sup>2</sup> doing flexibility training, and doing both strength and flexibility training.<sup>3</sup> This part is not included to the total physical activity score, but it is suggested to use it to inform the respondent about his/her current level of physical activity.<sup>6</sup> The RAPA has adequate sensitivity (81%), specificity (69%), positive predictive value (77%) and negative predictive value (%75) for defining the level of physical activity assessed with the Community Healthy Activities Model Program for Seniors (CHAMPS).<sup>6</sup>

#### PASE

The PASE is a 12-item, self-reported measure of the level of physical activity that was designed to be used among adults aged older than 65 years.<sup>4</sup> The items of the PASE include questions about the physical activities typically carried out by older adults, such as walking, recreational activities, exercise, housework, yard work and caring for

others. The frequency, duration and intensity level of physical activity are used to calculate the total score, where the higher scores indicate greater level of physical activity. The Turkish version of the PASE questionnaire was found to be valid ( $r = 0.40-0.59$ ) and reliable ( $r = 0.991$ ).<sup>10</sup>

*IPAQ-SF*

The IPAQ-SF is a self-reported measure to assess the level of physical activity. It asks about physical activity of four intensity levels including vigorous-intensity activities, such as aerobics, and moderate-intensity activities, such as leisure cycling, walking and sitting.<sup>11,12</sup> The total score is the summation of the duration and frequency of walking, moderate-intensity, and vigorous-intensity activity. The total score was reported as “Metabolic Equivalent of Task-min/week.” The sitting time is not included in the total physical activity score and was reported separately as “h/day.” The Turkish version of the IPAQ-SF was found to have adequate test-retest reliability ( $\rho = 0.69$ ) and concurrent validity, assessing the correlation with the energy expenditure measured with an accelerometer ( $\rho = 0.30$ ).<sup>13</sup>

**Statistical analysis**

Descriptive statistics were used to describe the characteristics of the participants. Mean and standard deviation were reported for continuous variables, and number and percent were reported for categorical variables.

The weighted kappa ( $\kappa$ ) was used to assess the test-retest reliability. The degree of test-retest reliability was reported as poor for  $\kappa < 0.20$ , fair for  $\kappa = 0.21-0.40$ , moderate for  $\kappa = 0.41-0.60$ , good for  $\kappa = 0.61-0.80$  and very good for  $\kappa = 0.81-1.00$ .<sup>14</sup>

The construct validity is established by presenting correlations between a measure of a construct and a number of other measures that should, theoretically, be associated with it (convergent validity) or vary independently of it (discriminant validity).<sup>15</sup> In other words, a positive correlation shows the convergent validity and a negative correlation shows the discriminant validity.<sup>15</sup> To assess the construct validity, we hypothesized that there would be a positive significant correlation between the RAPA and the other physical activity measures including PASE and IPAQ-SF. Additionally, we hypothesized that the RAPA would be negatively correlated with the IPAQ-SF sitting time. These hypotheses were tested investigating the Spearman’s rank correlation coefficients ( $\rho$ ). The validity was considered as acceptable if the  $\rho$  was more than 0.3.<sup>16,17</sup>

To assess the sensitivity, specificity, positive predictive value and negative predictive value of the RAPA, the IPAQ-SF scores were categorized as a dichotomous variable for defining the level of physical activity as active or inactive.

The level of significance was determined at  $P < 0.05$ . Data were analyzed using IBM SPSS Statistics (ver. 23.0;

SPSS, Chicago, IL, USA) and R: The R Project for Statistical Computing for Windows software.

**Results**

*Characteristics of the participants*

In total, 110 adults aged older than 50 years participated in the study. There were 68 female and 42 male participants with mean age of 70.5 years (10.5 years). The age ranged from 53 to 93 years. The characteristics of the participants are presented in Table 1.

*Cultural adaptation*

In the instructions page, there was a picture of “a man with his dog” for an example of light intensity level of physical activity. Because pets are not common in Turkish society, we changed the picture to “a man with his grandchild.” Additionally, in the same section, we changed the picture of “a man with a vacuum cleaner” to “a woman with a vacuum cleaner” for a similar cultural reason. In Turkish society, mostly women are responsible for household chores. The example of the vigorous intensity level of physical activity given was “Pickleball.” This game was excluded from the Turkish version, as it is an almost unknown game in Turkey. After these changes, the pre-final version was sent to the developer of the original RAPA, and her approval was obtained.

**Table 1** Characteristics of the participants ( $n = 110$ )

	Mean	SD
Age (years) <sup>†</sup>	70.5	10.5
Height (m) <sup>†</sup>	1.63	0.09
Weight (kg) <sup>†</sup>	77.2	13.3
Body mass index (kg/m <sup>2</sup> ) <sup>†</sup>	29.21	5.58
	<b>n</b>	<b>%</b>
Sex		
Female	68	61.8
Male	42	38.2
Residence		
Nursing home	53	48.2
Community	57	51.8
Level of education		
Illiterate	4	3.6
Primary school	44	40.0
Secondary school	14	12.7
High school	24	21.8
University	24	21.8
Marital status		
Single	5	4.5
Married	87	79.1
Other	18	16.4

<sup>†</sup>Variables are presented as mean and standard deviation (SD), because they are continuous.

In the cognitive debriefing process, the Turkish version of the RAPA was found to be easily understandable. There was no problem in regard to wording, terminology, instructions and clarity of the response options.

### Physical activity levels of the participants

Just 25.5% of the participants were regularly active according to the RAPA. Most of the participants reported that they did not do strength and/or flexibility training. The mean PASE score was 61.4 (SD 57.9). The mean IPAQ-SF total score was 1008.7 (SD 1184.7) Metabolic Equivalent of Task-min/week, and the mean sitting time was 6.8 h (SD 2.6 h). Table 2 presents the physical activity levels of the participants according to the RAPA, PASE and IPAQ-SF.

### Validity

There was a significant positive correlation between the RAPA 1 (aerobic) and PASE ( $\rho = 0.491$ ,  $P < 0.001$ ) and IPAQ-SF total score ( $\rho = 0.643$ ,  $P < 0.001$ ). A significant negative correlation was also found between the RAPA 1 (aerobic) and IPAQ-SF sitting time ( $\rho = -0.498$ ,  $P < 0.001$ ). The  $\rho$ -values showed that the convergent and discriminate validity (together construct validity) were acceptable.

**Table 2** Physical activity levels of the participants according to three physical activity measures ( $n = 110$ )

	n	%
RAPA 1 (Aerobic)		
Sedentary	3	2.7
Underactive	27	24.5
Regular underactive (light activities)	14	12.7
Regular underactive	38	34.5
Regular active	28	25.5
RAPA 2 (strength & flexibility)		
Strength training	3	2.7
Flexibility training	9	8.2
Both	41	37.3
None	57	51.8
	<b>Mean</b>	<b>SD</b>
PASE <sup>†</sup>	61.4	57.9
IPAQ-SF		
Total score (MET-min/week) <sup>†</sup>	1008.7	1184.7
Sitting time (h/day) <sup>†</sup>	6.8	2.6

<sup>†</sup>Variables are presented as mean and standard deviation (SD), because they are continuous. IPAQ-SF, International Physical Activity Questionnaire-Short Form; MET, Metabolic Equivalent of Task; PASE, Physical Activity Scale for the Elderly; RAPA, Rapid Assessment of Physical Activity.

### Reliability

The weighted  $\kappa$  for the RAPA 1 (aerobic) was calculated as 0.917 (95% CI 0.864–0.969), and interpreted as having very good test–retest reliability. The test–retest was also very high for the RAPA 2 (strength & flexibility), as its weighted  $\kappa$  was 0.894 (95% CI 0.828–0.959). The weighted  $\kappa$  coefficients also exceed 0.81 for each of the nine items.

### Sensitivity, specificity and predictive values

The RAPA showed good sensitivity and a positive predictive value. The sensitivity and specificity of the RAPA were 95.92% and 42.62%, respectively. The positive predictive value was 57.32%, and the negative predictive value was 92.86%.

### Discussion

The current study has suggested that the Turkish version of the RAPA was culturally relevant, and a valid and reliable outcome measure for assessing the level of physical activity in adults aged older than 50 years. Because the RAPA is very easy to use and calculate the score, we believe that it will be remarkable for researchers and clinicians.

The predefined hypotheses to assess the construct validity regarding the correlations between the RAPA and other physical activity measures were confirmed. The significant positive correlation between the RAPA, PASE and IPAQ-SF total score, and the significant negative correlation between the RAPA and IPAQ-SF sitting time have shown that the convergent and discriminant validity of the RAPA were acceptable. In the European Portuguese validation study of the RAPA, the authors reported a significant negative correlation between the World Health Organization Disability Assessment Schedule 2.0 and short performance physical battery (gait test), indicating that lower levels of physical activity were associated with worse self-reported disability and a slower walking speed.<sup>18</sup> In the same study, a significant positive correlation was also found between the RAPA and short performance physical battery total score, suggesting that higher levels of physical activity were associated with better performance.<sup>18</sup> The validation of the Spanish language version of the RAPA adapted for Chile was determined assessing the correlations between RAPA, body mass index and waist circumference.<sup>19</sup> The results showed that the Spanish version of the RAPA was valid, as it significantly and inversely correlated with body mass index and waist circumference.<sup>19</sup> Because the aforementioned studies used indirect measures of physical activity, we cannot directly compare the present results with theirs. However, it seems that the Turkish version was valid like the other versions, including the Spanish and European Portuguese versions.

In contrast, the validity of the Mexican Spanish version of the RAPA was determined by assessing the correlations between RAPA and accelerometer data as a direct measure of level of physical activity. There was a significant correlation between RAPA and minutes of moderate and vigorous physical activity, which indicated that this version of RAPA was valid.<sup>20</sup> In the original validation study of the RAPA, the CHAMPS moderate caloric expenditure was used to assess the validity, and the results showed that there was a significant correlation between the RAPA and CHAMPS ( $r = 0.54$ ).<sup>6</sup> Although we did not use the same direct measures of physical activity listed in other studies, the present results also showed that the RAPA was significantly correlated with other physical activity measures.

In the original study of the RAPA, the test-retest was not evaluated.<sup>6</sup> The test-retest reliability is important, because without it a measure cannot provide correct results and lead false conclusions. After the original validation study of the RAPA, the test-retest reliability was evaluated in the different language versions. The Mexican Spanish version showed lower test-retest reliability (intraclass correlation coefficient = 0.65).<sup>20</sup> However, we believe that because the RAPA score is a categorical variable, it is more suitable to use a weighted  $\kappa$  to evaluate the test-retest reliability. The European Portuguese version showed a moderate test-retest reliability with a weighted  $\kappa = 0.67$ .<sup>18</sup> In contrast, the Turkish version showed very high test-retest reliability with the weighted  $\kappa = 0.917$ . Although the Turkish version was found as a reliable measure of physical activity, it seems that there is confusion about the test-retest reliability of the RAPA in the literature, and it requires further investigation.

The Turkish version of the RAPA showed good sensitivity and a positive predictive value. The sensitivity was calculated as 95.92%, which means that the RAPA would lead to incorrectly classifying inactive persons as active persons 4.08% of the time. In the original study, the sensitivity of the RAPA (81%) was lower.<sup>6</sup> This difference might be due to different physical activity measurements (the IPAQ-SF vs the CHAMPS) used in the studies. The higher sensitivity value obtained in the present study shows that the Turkish version is better able to determine inactive persons. Individuals with any number less than 6 on the Turkish version of the RAPA should be considered as having a suboptimal level of physical activity.

The current study had some potential limitations. First, all the measures used for evaluating the validity were self-reported measures. Although these questionnaires are accepted as valid and reliable measures to assess the level of physical activity, objective measures such as accelerometers and/or the doubly labeled water method could have provided more accurate information about the validity of the Turkish version of the RAPA. Second, the operational qualities of the RAPA, such as time to

complete the questionnaire and administration mode (i.e. self-completed or interview-completed), were not recorded during the data collection. The difference in the administration mode could have an impact on the results. Finally, the cross-sectional design of the study prevented us from determining the responsiveness of the Turkish version of the RAPA to changes in time. Therefore, longitudinal studies are required.

The present study showed the Turkish version of the RAPA was an easy-to-use (even for illiterate people), valid and reliable measure of physical activity among adults aged older than 50 years. The present study has also provided considerable evidence about the test-retest reliability of the RAPA, which was not investigated in the original validation study of the RAPA.

## Acknowledgements

We would like to thank Dr. Tari D. Topolski for her permission to use the RAPA and her help during its cross-cultural adaptation into Turkish.

## Disclosure statement

The authors declare no conflict of interest.

## References

- Williams K, Frei A, Vetsch A, Dobbels F, Puhan MA, Rudell K. Patient-reported physical activity questionnaires: a systematic review of content and format. *Health Qual Life Outcomes* 2012; **10**: 28.
- Devereux-Fitzgerald A, Powell R, Dewhurst A, French DP. The acceptability of physical activity interventions to older adults: A systematic review and meta-synthesis. *Soc Sci Med (1982)* 2016; **158**: 14–23.
- Schrack JA, Cooper R, Koster A *et al*. Assessing Daily Physical Activity in Older Adults: Unraveling the Complexity of Monitors, Measures, and Methods. *J Gerontol A Biol Sci Med Sci* 2016; **71** (8): 1039–1048.
- Washburn RA, Smith KW, Jette AM, Janney CA. The Physical Activity Scale for the Elderly (PASE): development and evaluation. *J Clin Epidemiol* 1993; **46** (2): 153–162.
- Behavioral risk factor surveillance system survey questionnaire*. Atlanta, Georgia: US Department of Health and Human Services, Centers for Disease Control and Prevention, 2001; 22–23.
- Topolski TD, LoGerfo J, Patrick DL, Williams B, Walwick J, Patrick MB. The Rapid Assessment of Physical Activity (RAPA) among older adults. *Prev Chronic Dis* 2006; **3** (4): A118.
- Keskinoglu P, Ucku R, Yener G, Yaka E, Kurt P, Tunca Z. Reliability and validity of revised Turkish version of Mini Mental State Examination (rMMSE-T) in community-dwelling educated and uneducated elderly. *Int J Geriatr Psychiatry* 2009; **24** (11): 1242–1250.
- Nunnally J. *Psychometric theory*. New York: McGraw-Hill, 1978.
- Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine* 2000; **25** (24): 3186–3191.

- 10 Ayvat E. Comparison of the physical activity and performance measurements in elderly. MSc Thesis, Hacettepe University: Ankara (Publication No. 297228). 2011.
- 11 Craig CL, Marshall AL, Sjoström M *et al.* International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc* 2003; **35** (8): 1381–1395.
- 12 Guidelines for Data Processing and Analysis of the International Physical Activity Questionnaire (IPAQ) - Short Form (Version 2.0. April 2004), Available at: [http://www.institutferran.org/documentos/scoring\\_short\\_ipaq\\_april04.pdf](http://www.institutferran.org/documentos/scoring_short_ipaq_april04.pdf), Accessed: May 12, 2016.
- 13 Sağlam M, Arıkan H, Savcı S *et al.* International Physical Activity Questionnaire: Reliability and Validity of the Turkish Version. *Percept Mot Skills* 2010; **111** (1): 278–284.
- 14 Altman DG. *Practical Statistics for Medical Research*, 1 edn. London, UK: Chapman and Hall/CRC, 1990.
- 15 Westen D, Rosenthal R. Quantifying construct validity: two simple measures. *J Pers Soc Psychol* 2003; **84** (3): 608–618.
- 16 Terwee CB, Mokkink LB, van Poppel MN, Chinapaw MJ, van Mechelen W, de Vet HC. Qualitative attributes and measurement properties of physical activity questionnaires: a checklist. *Sports Med (Auckland, NZ)* 2010; **40** (7): 525–537.
- 17 Forsen L, Loland NW, Vuillemin A *et al.* Self-administered physical activity questionnaires for the elderly: a systematic review of measurement properties. *Sports Med. (Auckland, NZ)* 2010; **40** (7): 601–623.
- 18 Silva AG, Queirós A, Alvarelhão J, Rocha NP. Validity and reliability of the Portuguese version of the Rapid Assessment of Physical Activity questionnaire. *Int J Ther Rehabil* 2014; **21** (10): 469–474.
- 19 Pérez JC, Bustamante C, Campos S, Sánchez H, Beltrán Á, Medina M. Validation of the Rapid Assessment of Physical Activity Scale (RAPA) in an Adult Chilean Population Seeking Primary Care. *Aquaculture* 2015; **15** (4): 486–498.
- 20 Vega-López S, Chavez A, Farr KJ, Ainsworth BE. Validity and reliability of two brief physical activity questionnaires among Spanish-speaking individuals of Mexican descent. *BMC Res Notes* 2014; **7** (1): 1–8.