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Adaptation of REGICOR Short Physical Activity Questionnaire into Turkish: a Validity and Reliability Study

REGICOR Kısa Fiziksel Aktivite Anketinin Türkçeye Uyarlanması: Geçerlilik ve Güvenilirlik Çalışması

Ahmet Said Uyan[1], Hüseyin Tolga Acar[2], Esma Arslan[3], İrem Nur Erol[4], İzzet Ozan Acar[4], Furkan Hasan Küçük[5], Görkem Kıyak[1], Ayhan Canbulut[6], Sabriye Ercan[1], Cem Çetin[1]

[1]*Sports Medicine Department, Faculty of Medicine, Süleyman Demirel University, Isparta, Türkiye*
[2]*Sports Medicine Section, Antalya City Hospital, Antalya, Türkiye*
[3]*Sports Medicine Section, Van Training and Research Hospital, Health Sciences University, Van, Türkiye*
[4]*Faculty of Medicine, Süleyman Demirel University, Isparta, Türkiye*
[5]*Sports Medicine Section, Erzurum City Hospital, Erzurum, Türkiye*
[6]*Sports Medicine Section, Isparta City Hospital, Isparta, Türkiye*

ABSTRACT

Objective: The purpose of this study is to translate the REGICOR-short Physical Activity Questionnaire (REGICOR-sPAQ) into Turkish and assess its validity and reliability.

Material and Methods: REGICOR Short Physical Activity Questionnaire was translated by sports medicine specialists and language control was provided. For face and content validity, expert comments were gathered. The pilot study tested the questionnaire's validity and reliability. Data were collected at Süleyman Demirel University between January 2022 and March 2023. To examine the reliability, the REGICOR Short Physical Activity Questionnaire was administered to the participants twice and the results of the two questionnaires were examined by test-retest. To assess concurrent validity, participants were administered the International Physical Activity Questionnaire simultaneously and the results of the two surveys were evaluated by correlation analysis. To evaluate criterion validity, the participant filled out the questionnaire after using an accelerometer or pedometer for a week and the results were examined by correlation analysis. The survey was examined in terms of discriminant validity by asking sociodemographic and demographic questions along with the survey.

Results: The sample size consisted of 450 participants (253 female, 197 male; mean age: 26.6±9.4 years), most of whom were university students. The results obtained from the test-retest reliability for the REGICOR-sPAQ are at a good level (r=0.55-0.81; p<0.001). REGICOR-sPAQ is found to have good concurrent validity (r=0.29-0.78; p<0.001). The criterion validity is at the medium level (r=0.29-0.49; p<0.001). The REGICOR-sPAQ was able to make a statistically significant distinction between genders, chronic disease status and medication use in terms of distinction validity (p<0.05).

Conclusion: This study adapts an international questionnaire to evaluate physical activity in Türkiye. Based on these observations, it can be said that the Turkish version of the REGICOR-sPAQ is valid and reliable.

Keywords: *Adaptation work, physical activity, questionnaire*

ÖZ

Amaç: Bu çalışmanın amacı, REGICOR Kısa Fiziksel Aktivite Anketini Türkçeye uyarlamak, geçerliliğini ve güvenilirliğini değerlendirmektir.

Gereç ve Yöntem: REGICOR Kısa Fiziksel Aktivite Anketi spor hekimi uzmanları tarafından çevirisi yapılarak dil kontrolü sağlandı. Görünüş ve kapsam geçerliliği için uzman görüşleri alındı. Pilot uygulama ile anketin geçerliliği ve güvenilirliği incelendi. Araştırmanın verileri Ocak 2022-Mart 2023 tarihleri arasında Süleyman Demirel Üniversitesi'nde toplandı. Güvenilirliği incelemek için REGICOR Kısa Fiziksel Aktivite Anketi katılımcılara iki kez uygulandı ve iki anketin sonuçları test-retest yapılarak incelendi. Eş zamanlı geçerliliği değerlendirmek için katılımcılara aynı anda Uluslararası Fiziksel Aktivite Anketi uygulandı ve iki anketin sonuçları korelasyon analizi ile değerlendirildi. Kriter geçerliliği yönünden değerlendirmek için katılımcı bir hafta süreyle akselerometre veya adımsayar kullandıktan sonra anketi doldurdu ve sonuçları korelasyon analizi ile incelendi. Anketle birlikte sosyodemografik ve demografik sorular sorularak, anket ayrım geçerliliği yönünden incelendi.

Bulgular: Örneklem büyüklüğü çoğunluğu üniversite öğrencisi olan 450 katılımcıdan (253 kadın, 197 erkek; ortalama yaş: 26.6±9.4 yıl) oluştu. REGICOR Kısa Fiziksel Aktivite Anketi için test-retest güvenilirliğinden elde edilen sonuçlar iyi düzeyde idi (r=0.55-0.81; p<0.001). REGICOR Kısa Fiziksel Aktivite Anketinin eş zamanlı geçerliliği iyi bulundu (r=0.29-0.78; p<0.001). Ölçüt geçerliği orta düzeyde idi (r=0.29-0.49; p<0.001). REGICOR Kısa Fiziksel Aktivite Anketi, ayırt edici geçerlilik açısından cinsiyetler arasında, kronik hastalık durumunda ve ilaç kullanımında istatistiksel olarak anlamlı bir ayrım yapabildi (p<0.05).

Sonuç: Bu çalışma ile Türkiye'de fiziksel aktiviteyi ölçmek için kullanılmak üzere uluslararası bir anket uyarlandı. Bu bulgulara dayanarak REGICOR Kısa Fiziksel Aktivite Anketinin Türkçe versiyonunun geçerli ve güvenilir olduğu söylenebilir.

Anahtar Sözcükler: *Anket, fiziksel aktivite, uyarlama çalışması*

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Correspondence / Yazışma: Ahmet Said Uyan · Süleyman Demirel Üniversitesi, Tıp Fakültesi, Spor Hekimliği Anabilim Dalı, Isparta, Türkiye · ahmetsaiduyan@gmail.com

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The summary of this study was presented as an oral presentation at the 19th Turkish Sports Medicine Congress with International Participation.

INTRODUCTION

Physical activity has positive effects on physical and mental health. Physical activity, which is beneficial in both disease prevention and treatment processes, has linear relationship with health. Physical activity has been shown to positively impact health-related quality of life. Physical inactivity is shown as the fourth largest cause of death worldwide and is seen as a universal problem with undesirable health, economic, social and environmental consequences (1). An estimated 21-25% of breast and colon cancer cases as well as 30% of ischemic heart issues are attributed to physical inactivity (2).

Sedentary behavior is defined as actions like sitting and laying that involve an energy expenditure of 1.5 metabolic equivalents (MET) or less when the person is awake, whereas physical activity is defined as any bodily movement made by the skeletal muscles that requires energy. One MET represents energy expended while sitting at rest. Physical activities are often classified according to their intensity with reference to MET. The total weekly MET value is calculated by multiplying the physical activity MET value and the duration of physical activity (3). The measurement of physical activity is important for assessing public health and making necessary interventions (4).

Physical activity and sedentary behavior can be measured by various subjective or objective methods. Individuals answer questions by remembering their physical activities and sedentary behaviors, and as a result, they can get information about how active or sedentary they are (5). Questionnaires are often preferred today due to the fact that they are economical, easy to use and can reach a wide range of participants (6). Surveys can be administered in different ways: face-to-face, by mail, phone interview, and online. In the face-to-face interview method, the researcher interacts with the person answering the survey (7). Although the margin of error in surveys conducted in this way is lower, the response rate to the survey is higher, and the rate of removing unclear parts is higher. It can cause time burden for the researcher (8).

Pedometers and accelerometers, which have become widespread with the development of technology today, can be given as examples of indirect objective methods that quantify the amount of physical activity and inactivity (9). Although device-based measurements are usually more valid and reliable, they only calculate the time elapsed during body movements, in which case they provide information about the person's physical activity and sedentary performance while they are on the body (10). In addition, device-based measurements are performed in different areas (home, workplace, nature, gardening, etc.) lack the distinction of physical activities performed (11).

The International Physical Activity Questionnaire (IPAQ), which has short and long versions, is one of the commonly used questionnaires to evaluate physical activity. IPAQ short form is more widely used because it is shorter and more understandable than the IPAQ long form (12). The IPAQ short form consists of nine open-ended questions that question the person's light, moderate and high intensity physical activities and is a questionnaire to be filled out by remembering the person's last seven days. As a result, IPAQ short form calculates the total MET/min value at different physical activity intensities. There are some disadvantages of this form, though. The questions asked in the IPAQ short form are limited to reflecting different periods such as work, illness, vacation, since it can only evaluate the last week. In addition to providing ease of use and practicality, the IPAQ short form has only one question that questions sedentary behavior along with physical activity (13). Because the long form is lss understandable and longer, it may not be practicable to use in community screening (14).

In the REGICOR Short Physical Activity Questionnaire (REGICOR-sPAQ) with six different questions, it was asked how many days a month and how many minutes a day members of the general public engaged in physical activity (normal walking, brisk walking, nature walking, stair climbing, field and garden work, exercise and sports) in their leisure time (12). The answers given to the questionnaire can estimate energy expenditure for light (<4 MET), moderate (4-5.5 MET), and vigorous (>6 MET)) physical activities as well as the total weekly energy expenditure with the developed algorithm. In order to determine the weekly inactivity time, time spent in front of the TV, computer, game console is asked separately, on a work or holiday day. Finally, the questionnaire includes a 6-choice question to determine the occupation's physical activity level. (15). In this study, it is aimed to adapt the REGICOR-sPAQ to Turkish, to evaluate its validity and reliability with the staff and students of our university.

MATERIAL and METHODS

Study Design

Permission was obtained via e-mail on November 29, 2021, to adapt into Turkish the REGICOR-sPAQ developed by Molina et al. (15). The research was approved with the Süleyman Demirel University Clinical Research Ethics Board of Medical Faculty ethics committee permission dated 23/12/2021 and numbered 377. Upon obtaining the permissions, the questionnaire was first translated into Turkish. Then, in turn, cross-cultural validation, expert panel (observational validity), expert opinions (content validity), pilot study, sample size estimation, test-retest reliability,

construct validity (concurrent validity, criterion validity), and discrimination validity, statistical analyses steps were applied.

Translation Steps

In order to use REGICOR-sPAQ in Turkish, the translation steps were carried out using the guide that allows the scale and measurement tools created in different languages by Souza and Rjiianastrirat to be used in the desired language (16). The questionnaire was translated into Turkish by three independent sports medicine specialists with a good level of English. The senior researcher combined the three translations into a single questionnaire by fixing inconsistent translations. Two distinct translators who were native English speakers and had a strong grasp of Turkish translated the questionnaire from Turkish into English without seeing the original. All translations were compared with the original by the responsible researcher and the Turkish version of the questionnaire was obtained (Appendix 1).

Cross-cultural Validation

Participants

The study was conducted between January 2022 and March 2023. In order to reach a heterogeneous group in terms of age, socioeconomic status and physical activity, academic and administrative staff and students working at Süleyman Demirel University Medical Faculty formed the population of the study. Nothing personal was accessed, and data were handled with confidentiality. No private information was disclosed, and privacy was upheld. Every participant said that they gave their informed permission. Information about the descriptive data of the participants was provided with the data form prepared by the researchers.

Procedure

Face-to-face interviews with 450 individuals were used to complete the data form, which included questions and participants' descriptive information. Participants who agreed to use it during the criterion validity phase were followed with accelerometer devices for one week.

REGICOR-sPAQ Calculation Method

The REGICOR-sPAQ may be used to assess overall energy expenditures in leisure activities as well as energy expenditures at various levels of physical activity intensity. The REGICOR-sPAQ classified physical activity into light (<4 MET), moderate (4-5.5 MET), and vigorous (>6 MET) intensity levels. All estimates were made as MET-min/wk. Energy expenditure estimates and total energy expenditure estimates for physical activities of different intensities were estimated using the formulae of the REGICOR-sPAQ's Estimate of Energy Expenditure in Physical Activity, as shown in Appendix 1.

The estimated total energy expenditure score obtained in REGICOR-sPAQ was categorized as 0-600 METs, 600-3000 METs and over 3000 METs, inspired by the IPAQ short form. These data were presented as descriptive numbers and percentages, by calculating the Kappa value for test-retest reliability. Occupational physical activity categorical variable was presented as descriptive number and percentage.

Weekly sedentary time (hours) = [(Number of days worked per week) x (hours spent in front of TV, games, computer during working day)] + [(number of days worked in 7-week) x (daily TV, game, computer on vacation day) elapsed time)] was calculated using the formula. The total sedentary time obtained was categorized as 0-28 hours per week, over 28 hours per week, and descriptive values were presented as numbers and percentages, and Kappa value was calculated for test-retest reliability (17).

Measuring Devices (Pedometer / Accelerometer)

The Xiaomi Mi Band 5 (Xiaomi, Beijing, China) is a device equipped with a three-axis accelerometer and a three-axis gyroscope. The reason for its use as a pedometer is primarily because it has a sensor fundamentally used to calculate step counts. The accelerometer detects vibrations occurring with each step taken by the user, thereby estimating the step count. The device is attached to the non-dominant wrist by following the instructions in the user manual. Participants were asked to note down the number of steps before going to sleep every day for a week and forward them to the researcher.

SenseWear Armband Pro 2 (SWA) (BodyMedia Inc., Pittsburgh, PA, USA) was used as the accelerometer. The Sense Wear armband has 2-direction accelerometer, heat transfer, body temperature, surrounding temperature close to the body, and galvanic skin response sensors. It indirectly gives energy consumption, number of steps, physically active time, sedentary time, sleep time and average MET values through its sensors and software. In accordance with the user manual, the upper right arm is attached to the triceps brachii muscle line in such a way that it touches the skin. Participants were told to continue their daily lives with an accelerometer for a week. At the end of this period, the accelerometer data of the participant were recorded on the computer by the researchers using the SenseWear Armband v.1.0 software program.

Observational Validity and Content Validity

For the observational validity and content validity, opinions were obtained from six academicians (two in Sports Medicine, and Physiotherapy and Rehabilitation each; one

in Public Health and Family Medicine each) through qualitative and quantitative data collection forms. The content validity of the questionnaire was analyzed with the feedback obtained. I-CVI values were calculated as 0.83-1.00, and S-CVI value was calculated as 0.97, and it was determined that content validity was achieved.

Pilot Study

Data in the pilot phase of the study were collected by the researchers in a face-to-face environment. The surveys were conducted on a total of 20 people, including academic, administrative staff and students working at the state university. At this stage, in addition to the nine questions in the survey translated into Turkish, participants were asked to give descriptive information such as age, gender, marital status, education level, profession, income level, presence of psychological and chronic diseases and medication use.

Sample Size Estimation

In validity and reliability studies, it is recommended to recruit at least 10 times the number of participants in the survey for sample size (18). In this context, it is sufficient to reach at least 90 people with a scale consisting of nine items. A total of 450 people were reached with the convenience sampling method. With this number, 25 % of the Süleyman Demirel University Faculty of Medicine universe has been reached.

Test Retest Reliability

Kappa analysis and Spearman Rho correlation analysis were performed to assess test-retest reliability of categorical variables. Occupational physical activity variable, total energy expenditure score and categorical variables of weekly sedentary time were subjected to Kappa analysis. Spearman rho correlation analysis was performed on energy scores for light, moderate, and vigorous intensity physical activity, as well as the overall energy expenditure score and questions assessing sedentary behavior.

Construct Validity

Concurrent Validity

For concurrent reliability and validity, the IPAQ short form, developed by Öztürk and colleagues in the Turkish reliability and validity study, was used to gauge light, moderate and vigorous-intensity physical activity performed in the last week (13). The variables that can be compared in the IPAQ short form and the REGICOR-sPAQ are similar. All physical activity variables were evaluated with Spearman rho correlation analysis as they did not fit the normal distribution.

Criterion Validity

In order to understand that participants filled out the surveys correctly, it is necessary to evaluate them with objective measurement tools. In previous studies, accelerometers or pedometers were generally used to assess physical activity. In this study, Armband and step count MI Band were used for criterion validity. The number of steps obtained from the MI Band and the physically active time and step count values obtained from the Armband were subjected to Spearman rho correlation analysis with the total physical energy expenditure score and sedentary time obtained from REGICOR-sPAQ.

Discriminant Validity

Discriminant validity was used to determine structural validity. A data form inquiring about sociodemographic and health status was used to learn the ability of the questionnaire to distinguish the physical activity levels of different subgroups.

Statistical Analyses

In the analysis of data, SPSS v.23 package programs were used. The Shapiro-Wilk test examined if the quantitative data followed a normal distribution. The difference amongst categorical variables was evaluated through the Chi-Square test with Monte Carlo correction, and the difference between the quantitative variables was assessed with the Mann-Whitney U and Kruskal-Wallis tests. Spearman correlation analysis was used for the correlation analysis. Kappa compliance coefficient was preferred for the examination of test-retest data. The data are presented as frequency (n), percentage ratio (%), mean ± standard deviation, and minimum-maximum. Under the 0.05 threshold, the p-value was regarded as significant. The rho value was interpreted as very low correlation between 0.0-0.2, low correlation between 0.21-0.4, moderate correlation between 0.41-0.6, high correlation between 0.61-0.8, and very high correlation for >0.8. Kappa values between 0.00-0.20 were interpreted as very low compliance, 0.21-0.40 low level compliance, 0.41-0.60 moderate compliance, 0.61-0.80 good level compliance, and 0.81-1.00 very good level of compliance (18).

RESULTS

This study included 450 participants, whose descriptive features are given in Table 1. The mean age of the participants was 26.6±9.4 years and the mean body mass index was 23.4±4.3 kg/m^2. The categorical data of occupational physical activity that the participants answered in the REGICOR-sPAQ are given in Table 1. Physical activity data of the participants in the weekly MET-min are summarized in Table 2.

The 600 MET-min/wk level that WHO recommends was met by 86.6% of the participants.

Table 1. Descriptive data of participants

Features	**n**	**%**
Gender		
Female	253	56.2
Male	197	43.8
Age (yrs)		
18-34	367	81.5
35-44	34	7.6
≥45	49	10.9
Body Mass Index (kg/m²)		
<18.5	37	8.2
18.5-24.9	287	63.8
25.0-29.9	97	21.6
≥30	29	6.4
Marital status		
Married	92	20.5
Single	358	79.5
Education		
Primary school	23	5.1
High school	38	8.4
College / University	356	79.2
Master's degree / PhD	33	7.3
Income		
Less than expenses	134	29.8
Equal to expenses	231	51.3
More than expenses	85	18.9
Chronic disease presence		
Yes	76	16.9
No	374	83.1
Psychological disease		
Yes	31	6.9
No	419	93.1
Continuous drug use		
Yes	55	12.2
No	395	87.8
Occupational physical activity		
Very light physical effort	156	34.6
Light physical effort	69	15.3
Moderate physical effort	76	16.9
High physical effort	97	21.6
Very high physical effort	34	7.6
Vigorous physical effort	18	4.0
REGICOR-sPAQ total physical activity level (MET min/wk)		
<600	60	13.3
600-3000	285	63.4
>3000	105	23.3

MET: metabolic equivalent

Table 2. REGICOR-sPAQ physical activity characteristics of Individuals

Physical activity status	**Mean±SD**	**Median**	**Min-Max**
Light-intensity PA (MET-min/wk)	1073±1657	839.2	0-27972
Moderate-intensity PA(MET-min/wk)	453.2±1457	139.9	0-16608
Vigorous-intensity PA(MET-min/wk)	938.6±1819	244.8	0-22009
Total energy expenditure in PA (MET-min/wk)	2465±3428	1644	0-41881
Time spent sedentary in the working day (hrs)	2.68±2.04	2	0-15
Sedentary time spent on vacation (hrs)	3.99±2.79	4	0-15
Number of days worked per week (n)	4.66±1.48	5	0-7

MET: metabolic equivalent, SD: standard deviation, PA: physical activity

Reliability Analysis

The test-retest reliability for the categorical variables of REGICOR-sPAQ is shown in Table 3. The Kappa value for the physical activity level was 0.96, and a very good level of compliance was achieved. For the categorical variable of occupational physical activity, the Kappa value is 0.64 and reveals a good level of compliance. The Kappa value for sedentary time was 0.75 and a good level of compliance was found. The test-retest reliability of physical activity intensity and sedentary time data of REGICOR-sPAQ is displayed in Table 4. Spearman rho correlation values for physical activity intensity and sedentary behavior ranged 0.55-0.81.

Table 3. Test-retest reliability for presence of physical activity

Parameter	Kappa	p
Amount of physical activity (MET-min/wk)		
0-600		
600-3000	0.96	**<0.001***
>3000		
Occupational physical activity		
Very light PE		
Light PE		
Moderate PE	0.64	**<0.001***
High PE		
Very high PE		
Vigorous PE		
Sedentary time (hrs/wk)		
0-28	0.75	**<0.001***
>28		

MET: metabolic equivalent; PE: physical effort; *: p is significant at the 0.05 level.

Construct Validity

To assess concurrent validity, the association between the REGICOR-sPAQ and the IPAQ short form was investigated. According to the Spearman rho correlation analysis, the lowest correlation was observed at the moderate intensity physical activity level (r=0.29, p<0.001),

Table 4. Test-retest reliability for physical activity level

Physical activity (n=100)	Spearman's Rho	p
Light-intensity PA (MET-min/wk)	0.72	**<0.001***
Moderate-intensity PA (MET-min/wk)	0.55	**<0.001***
Vigorous-intensity PA (MET-min/wk)	0.81	**<0.001***
Total energy expenditure in PA (MET-min/wk)	0.78	**<0.001***
Time spent sedentary in the working day (hrs)	0.73	**<0.001***
Sedentary time spent on vacation (hrs)	0.80	**<0.001***
Number of days worked per week	0.69	**<0.001***

MET: metabolic equivalent; PA: physical activity; *: p is significant at the 0.05 level.

and the highest correlation was observed in the time spent sedentary (r=0.78, p<0.001). For criterion validity, the correlation between total energy expenditure score (MET-min) obtained from REGICOR-sPAQ and inactive time and total number of steps per week is shown in Table 5. There was a moderate correlation (r=0.49, p<0.001) between pedometer-measured steps and total energy expenditure. It was found that there was a low level of negative correlation between the number of steps and the time spent sedentary (r=-0.30, p<0.001).

The correlation between the total energy expenditure score and the number of steps obtained from the SenseWear Armband and the physical active time is also shown in Table 5. It yielded a moderate correlation between the whole physical activity point and the step count obtained from the armband (r=0.41, p<0.001). The total energy expenditure score revealed low correlation with the physically active time obtained from the armband (r=0.29, p<0.001).

Table 5. Validity analyzes compared to IPAQ Short Form, pedometer and armband

Physical Activity	Spearman's Rho	p
Concurrent validity between IPAQ short form and REGICOR-sPAQ		
Light-intensity PA	0.65	**<0.001***
Moderate-intensity PA	0.29	**<0.001***
Vigorous-intensity PA	0.48	**<0.001***
Total energy expenditure in PA	0.65	**<0.001***
Sedentary behavior (hours/week)	0.78	**<0.001***
Concurrent validity between step count and REGICOR-sPAQ		
Total energy expenditure in PA	0.49	**<0.001***
Sedentary behavior (hrs/wk)	-0.30	**0.032***
Concurrent validity between Armband and REGICOR-sPAQ		
Total energy expenditure in PA		
Number of steps obtained from Armband	0.41	**0.003***
Physical active time according to data Armband record	0.29	**0.041***

IPAQ: International Physical Activity Questionnaire; PA: physical activity; *: p is significant at the 0.05 level.

Structural Validity

For discriminant validity, the discrimination of total energy expenditure score with gender, age, body mass index, marital status, education status, income status, chronic disease status, psychological illness status, and drug use was examined. A statistically significant difference was found between genders (p=0.035), in chronic disease status (p=0.001), and drug use (p=0.008). In other variables, no statistically significant difference was determined (Table 6).

Table 6. MET-min PA levels and comparisons of subgroups

Parameter	n	Mean±SD	Median	Min-Max	p
Gender[M]					
Female	253	2276±3571	1497	0-41881	**0.035***
Male	197	2708±3227	1871	0-32832	
Age (yr)[K]					
18-34	367	2469±3571	1690	0-41881	0.53
35-44	34	2417±3253	1236	73-17197	
≥45	49	2466±2317	1487	0-9783	
BMI (kg/m²)[K]					
Underweight (<18.5)	37	2612±3031	1490	82-17197	0.61
Normal (18.5-24.9)	287	2447±3414	1717	0-41881	
Overweight (25-30)	97	2250±2073	1654	0-11360	
Obese (>30)	29	3175±6588	1182	49-32832	
Marital status[M]					
Married	92	3034±5572	1698	0-41881	0.73
Single	358	2319±2600	1644	0-32832	
Education status[K]					
Primary school	23	1884±1500	1357	98-5268	0.86
High school	38	3723±5500	1640	0-29252	
College/University	356	2375±3304	1644	0-41881	
MS degree/PhD	33	2391±2229	1734	392-11360	
Income status[K]					
Income < expenses	134	2364±4003	1292	0-32832	0.06
Income = expenses	231	2540±3410	1788	0-41881	
Income > expenses	85	2422±2356	1960	49-16741	
Chronic disease status[M]					
Yes	76	1589±1500	1140	0-7636	**0.001***
No	374	2643±3674	1768	0-41881	
Psychological disease[M]					
Yes	31	3050±3304	2231	0-17197	0.11
No	419	2422±3436	1617	0-41881	
Continuous drug use[M]					
Yes	55	1805±1917	1096	0-9281	**0.008***
No	395	2557±3580	1734	0-41881	

PA: physical activity; BMI: body mass index. K: Kruskal Wallis test was performed due to non-normal distribution. M: Mann-Whitney U test was performed due to non-normal distribution. SD: standard deviation;*: p value is significant at the 0.05 level.

DISCUSSION

REGICOR-sPAQ; It contains questions that can classify leisure physical activity as light, moderate and vigorous, make a categorical classification of occupational physical activity and provide details regarding sedentary behavior. The questionnaire is a viable and trustworthy tool for estimating sedentary behavior and moderate-to-intense leisure physical activity. The original version of the REGICOR-sPAQ developed by Molina and colleagues has sufficient statistical values to evaluate physical activity and inactive behavior (12). Statistical analyses have shown that REGICOR-sPAQ, which we translated into Turkish, is a reliable and valid measuring tool.

In our study, the Kappa value displays a very good level for physical activity, a good level for the categorical variable of occupational physical activity, a good level of compliance for sedentary time. Spearman rho correlation coefficients for physical activity intensity and sedentary behavior ranged from moderate to very high. According to the Spearman rho correlation analysis conducted for the IPAQ short form and REGICOR-sPAQ, the lowest correlation was observed at the degree of moderate-intensity physical activity, highest correlation was observed during sedentary time. The number of steps and overall physical activity were shown to be somewhat correlated, whereas the number of steps and time spent sedentary were found to be inversely correlated, although not significantly so. When the correlation between the number of steps obtained from the SenseWear Armband and the physical active time was assessed, a moderate correlation was present between the total energy expenditure and step counts measured from the armband. A low level of correlation was determined between the total energy consumption score obtained from REGICOR and the time spent physically active obtained from the armband. When a data form asking about descriptive features was given for discriminant validity, a statistically significant difference was present between genders, the state of chronic diseases, and drug usage.

In the reliability analysis performed with Spearman rho correlation for physical activity intensity and inactive behavior, coefficients varied from 0.55 (moderately correlated for moderate-intensity physical activity) to 0.81 (very highly correlated for vigorous-intensity physical activity) in the

present study. In the original article, these values ranged from 0.79 (highly correlated for modest degree of physical activity) to 0.94 (very highly correlated for vigorous-intensity physical activity) (15). The reason why the correlation coefficient is lower in our study can be explained by the fact that the number of participants is higher than the original version.

According to the correlation analysis between the REGICOR-sPAQ and the IPAQ short form for concurrent validity, the lowest correlation was at the modest degree of physical activity, and the highest correlation was in the time spent sedentary. In the original article, physical activity levels of the Minnesota Leisure Time PA Questionnaire (MLTPAQ), which evaluates the intensity of leisure-time physical activity and classifies it as light-moderate-vigorous physical activity, were compared with the REGICOR-sPAQ. The REGICOR-sPAQ was found to be associated at a higher level than MLTPAQ at all physical activity levels (15).

In our study, the correlation between the total energy expenditure score (MET-min) obtained from the REGICOR-sPAQ, and the sedentary time and the weekly total number of steps measured with the pedometer device were evaluated for criterion validity. It was seen that the number of steps and total physical activity were moderately related. We found that the number of steps taken and the amount of sedentary time had a low inverse correlation. Again, the correlation between total energy expenditure score (MET-min) obtained from the REGICOR-sPAQ and the number of steps obtained from the SenseWear Armband, and physical active time were evaluated for criterion validity. There was a moderate association between the overall energy expenditure score and the number of steps collected from the armband.

In the original article, the REGICOR-sPAQ and accelerometer (step episodes longer than 3 and 10 min) were compared for criterion validity. There was a low level of correlation between the total energy expenditure score and the 3-min accelerometer data. However, in the original study, a low level of correlation was reported between the REGICOR-sPAQ and weekly sedentary behavior detected by the accelerometer (15). Compared with the original study, the fact that the research was carried out in a younger population that was accustomed to technology and with two different assistive devices and more participants may explain the stronger correlation seen in our study.

CONCLUSION

As a consequence, the REGICOR-sPAQ test-retest reliability scores are at an acceptable level. Concurrent validity of the REGICOR-sPAQ was good. Criterion validity was moderate. The REGICOR-sPAQ was able to make a statistically significant distinction between genders, chronic disease status and medication use in distinction validity. In this study, an international questionnaire used to measure physical activity was adapted into Turkish. Based on these results, it can be said that the Turkish version of the REGICOR-sPAQ is valid and reliable.

REGICOR-sPAQ contains both categorical and measurement-type questions. It can calculate physical activity levels of different intensities and total physical activity score as MET-min/week. It can evaluate the sedentary behavior of the person outside of his professional life. Finally, it can provide information to the interviewer about the physical activity level of the person's profession. REGICOR-sPAQ comprehensively evaluates the person's time period outside of sleep, without leaving any time gap. Detailed information about the participant's physical activity status is obtained by routinely answering the questions for one month. The survey provides ease of use without creating a time and financial burden for participants and researchers.

Our study was conducted with a group of young participants, the majority of whom were students, at a state university in Türkiye. For this reason, one of the limitations is the inability to reach a participant audience that will include different age groups and different geographical regions. It may be possible in future studies to eliminate this deficiency by planning the physical activity survey, which we adapted into Turkish, in different age groups and different samples.

Ethics Committee Approval / Etik Komite Onayı

The approval for this study was obtained from Süleyman Demirel University Ethics Committee (Decision No: 377, dated 23.12.2021).

Conflict of Interest / Çıkar Çatışması

The authors declared no conflicts of interest with respect to authorship and/or publication of the article.

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Author Contributions / Yazar Katkıları

Concept – SE; Design – SE, HTA, EA; Supervision – SE, CÇ, ; Materials – ASU, GK, AC, SE; Data Collection and/or Processing – ASU, İNE, İOA, AC, GK, FHK; Analysis and Interpretation – SE, HTA, ASU; Literature Review – ASU, FHK, AC, SE; Writing Manuscript – ASU, İNE, İOA, FHK, SE; Critical Reviews – EA, GK, SE, CÇ

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Appendix-1. REGICOR Short Physical Activity Questionnaire-TR

REGICOR Kısa Fiziksel Aktivite Anketi-TR

Serbest zaman fiziksel aktivitesi

Size bir ay boyunca sürdürdüğünüz fiziksel aktiviteniz hakkında bazı sorular soracağım.

Rutin bir ayda:

1. a. Kaç gün yavaş veya normal tempoda yürüyüşe çıkarsınız?*	.....gün
b. Günde ortalama kaç dakika?	...../.....dk/gün
2. a. Kaç gün hızlı yürüyüş yaparsınız (tempolu yürüyüş)?	.....gün
b. Günde ortalama kaç dakika?	...../.....dk/gün
3. a. Kaç gün doğa yürüyüşü yapar veya dağlarda yürürsünüz?	.....gün
b. Günde ortalama kaç dakika?	...../.....dk/gün
4. a. Kaç gün merdiven çıkarsınız?	.....gün
b. Günde ortalama kaç kat?	kat/gün
5. a. Kaç gün tarla veya bahçe işlerinde çalışırsınız?	.....gün
b. Günde ortalama kaç dakika?	...../.....dk/gün
6. a. Kaç gün evde, dışarıda/spor salonunda egzersiz veya spor yaparsınız?	.....gün
b. Günde ortalama kaç dakika?	...../.....dk/gün

* NOT: İşe gidip gelmek için yapılan yürüyüş dâhildir. İşe bisikletle gidip gelmek veya hobi amacıyla bisiklet sürmek de bu maddeye dâhil edilebilir.

Sedanter (Hareketsiz) Davranış

Çalışma süresi hariç işte çalıştığınız bir gün boyunca, ortalama kaç saat TV izler veya bir bilgisayar başında oturur veya video oyunları oynarsınız?	...../.....saat/gün
İşte çalışmadığınız bir gün boyunca, ortalama kaç saat TV izler veya bir bilgisayar başında oturur veya video oyunları oynarsınız?	...../.....saat/gün
Haftada kaç gün çalışıyorsunuz?	.....gün

Mesleki Fiziksel Aktivite

Mesleğinizde (veya günlük yaşamınızda) ne tür fiziksel aktivite yaparsınız?

a. Genelde otururum ve çok az yürürüm (idari,...)

b. Oturuyorum ama çok sık orta şiddette efor sarf ederim (kasiyer,...)

c. Genelde ayakta dururum ve çok az yürürüm

d. Çok yürürüm ama yoğun efor sarf etmem (satış elemanı, esnaf,...)

e. Çok yürürüm ve yoğun efor sarf ederim (postacı, kurye,...)

f. Genelde yoğun efor sarf ederim (inşaat işçisi,...)

Fiziksel aktivitede serbest zaman enerji harcamasını tahmin etmek için algoritmalar

REGICOR fiziksel aktivite anketi ile serbest zaman fiziksel aktivitesinde toplam enerji harcamasını tahmin edebiliriz. Ayrıca, fiziksel aktivitedeki enerji harcamasını aktivitenin şiddetine göre tahmin edebiliriz: hafif şiddetli fiziksel aktivite (<4 MET), orta şiddetli fiziksel aktivite (4-5,5 MET) ve yüksek şiddetli fiziksel aktivite (≥6 MET). Tüm tahminler MET-dk/hafta olarak ifade edilir.

Hafif yoğunluklu fiziksel aktivitede enerji harcamasının tahmini (FAEH $_{Hafif}$)

FAEH $_{Hafif}$ = [(Yürünen gün sayısı (1.a) x Günlük yürüyüş dakikası (1.b) x 4 MET) / 4.29]

Orta yoğunluklu fiziksel aktivitede enerji harcamasının tahmini (FAEH $_{Orta}$)

FAEH $_{Orta}$ = [(Tempolu yürüyüş yapılan gün sayısı (2.a) x Günlük tempolu yürüyüş dakikası (2.b) x 5 MET) / 4.29] + [Bahçe işleri yapılan gün sayısı (5.a) x Günlük bahçe işlerinin dakikası (5.b) x 5 MET) / 4.29]

Yüksek yoğunluklu fiziksel aktivitede enerji harcamasının tahmini (FAEH $_{Yüksek}$)

FAEH $_{Yüksek}$= [(Doğada yürünen gün sayısı (3.a) x Günlük doğa yürüyüş dakikası (3.b) x 6 MET) / 4.29] + [(Merdiven çıkılan gün sayısı (4.a) x Günlük çıkılan kat sayısı (4.b) x 3.5 MET) / 4.29] + [(Egzersiz/spor yapılan gün sayısı (6.a) x Günlük egzersiz dakikası (6.b) x 11 MET) / 4.29]

Fiziksel aktivitede toplam enerji harcamasının tahmini (FAEH $_{Toplam}$)

FAEH $_{Toplam}$ =FAEH $_{Hafif}$ + FAEH $_{Orta}$ + FAEH $_{Yüksek}$