BMC Geriatrics

RESEARCH

Open Access

Adaptation of LASA sedentary behaviour questionnaire into Turkish and examination of its psychometric properties in elderly individuals

Müseddin Muratoglu[1], Göksel Çilga[2], Duygu Ilgin Gunduz[2,4*] and Esra Sude Akin[3]

Abstract

Objective This study was conducted to adapt the Longitudinal Aging Study Amsterdam Sedentary Behavior Questionnaire (LASA-SBQ) into Turkish. Turkish translation, validity and reliability studies were performed.

Materials and methods A total of 100 volunteers (50 female), aged 65 years and over (median age: 71.00), with a score of 23 for educated and 19 or above for uneducated, on the Mini Mental State Examination and the Barthel Index score of 61 or above were included in the study. Sociodemographic data of the participants were recorded with the evaluation form. LASA-SBQ, the Sedentary Behavior Questionnaire (SBQ), Epworth Sleepiness Scale and International Physical Activity Questionnaire Short Form were applied. SPSS 26.00 software was used for statistical analyses. $P<0.05$ was accepted as statistical significance level. Cultural adaptation of the questionnaire was performed in accordance with the Beaton protocol. After the translation of the questionnaire, its psychometric properties were examined and validity and reliability analyses were performed.

Results The mean time spent by the participants as sedentary in a week was 9.390 ± 3.733 h. There was a correlation between the LASA-SBQ and the total score of the SBQ (Pearson $r=0.757$; $p<0.01$). The test-retest reliability of the LASA-SBQ was examined and the intraclass correlation coefficient was found to be 0.978. In order to examine the validity of the questionnaire together with the SBQ, Bland-Altman analysis was performed and a graph was drawn. Bland-Altman analysis shows that the validity of the questionnaire is high.

Conclusion-Discussion The LASA-SBQ was translated into Turkish and culturally adapted. The psychometric properties of the questionnaire were examined and validity and reliability analyses were performed. The Turkish version of the LASA-SBQ is a valid and reliable scale and is suitable for use in scientific research.

Keywords LASA, Sedentary behavior, Physical inactivity, Validity, Reliability

*Correspondence:
Duygu Ilgin Gunduz
duygulgn@gmail.com; duygu.ilgin@cbu.edu.tr
[1]Institude of Postgraduate Education, Department of Physiotherapy and Rehabilitation, Antalya Bilim University, Antalya, Türkiye
[2]Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Manisa Celal Bayar University, Manisa, Türkiye
[3]Institute of Health Sciences, Department of Physiotherapy and Rehabilitation, Izmir Democracy University, Izmir, Türkiye
[4]Manisa Celal Bayar Üniversitesi, Sağlık Bilimleri Fakültesi, Fizyoterapi ve Rehabilitasyon Bölümü, Uncubozköy Sağlık Yerleşkesi, Uncubozköy M. 5526 Sk. No:8/4, PK:45030, Yunusemre, Manisa, Türkiye

Introduction

Sedentary behavior is used to define any awake activity characterised by an energy expenditure of 1.5 metabolic equivalents or less while sitting, lying or reclining [1]. It has been reported that sedentary time is increasing in today's digitalised living conditions [2]. The prevalence of inactivity is highest among people aged 65 years and older and this age group is the fastest growing age group worldwide [3]. Elderly individuals are faced with physical activity barriers such as the belief that they are too old or too weak for physical activity, the fact that exercise is not considered as a necessary health prescription and the high number of health problems [4]. In our country, it is reported that the rate of those who never exercise increases with age in both men and women [5].

In a study, it was found that 15.10% of the 65–74 age group had adequate, 24.70% had moderate and 60.20% had inadequate physical activity level. At the age of 75 years and older, it was determined that the time spent sedentary increased and only 10.80% of the elderly individuals participated in physical activity at an adequate level [6]. Decrease in physical activity and increase in sedentary time are accepted as risk factors for Alzheimer's disease, diabetes, metabolic syndrome, some types of cancer and cardiovascular diseases [7]. It is emphasised that cardiovascular, metabolic and functional benefits can be provided in elderly individuals by reducing the time spent with sedentary behaviors only, regardless of physical activity participation [8, 9].

Falck et al. reported a negative and complex relationship between sedentary behavior and cognitive function in individuals over 40 years of age in their review study [10]. Schuch et al. in their meta-analysis study, they reported that sedentary behavior habit continuing for 9 h daily caused mortality in adult individuals [11]. Sedentary behavior in elderly individuals seems to be related with vital functions [12]. Physical activity aims to increase muscle mass and strength, cardiovascular fitness, balance and coordination in the elderly individuals [13]. Although studies have revealed many important benefits of physical activity for older people, approximately 94% of the elderly population cannot meet the current physical activity recommendations due to reasons such as lack of knowledge, lack of motivation or poor health [14].

In the literature, methods for assessing sedentary behaviour can be divided into two main groups: subjective (questionnaire, single question, diary) and objective (accelerometer). These subjective methods examine different sedentary behaviours, are practical, easy to use, inexpensive, allow for a large number of cases and do not negatively influence behaviour. One of the main advantages of subjective methods is that they provide more detailed information about sedentary time. The main disadvantages include recall bias and the underestimation of sedentary time. Among objective methods, accelerometers are advantageous because they are reliable and valid reference methods. However, measurement methods can vary and reference values need to be clearly established. In addition, they are more expensive than subjective methods and the Hawthorne effect is the main disadvantage [15–19]. In the above mentioned literature, the importance of assessing sedentary behaviour for elderly individuals and the necessity of developing reliable and valid methods are mentioned [15, 17–19]. The Longitudinal Aging Study Amsterdam Sedentary Behavior Questionnaire (LASA-SBQ) was developed especially for the assessment of sedentary behavior in elderly individuals. LASA-SBQ is a self-report instrument developed to evaluate the amount of time doing ten specific behaviors on weekdays and weekend days [20]. However, to the best of our knowledge, there is no questionnaire assessing sedentary behaviour in the elderly that has undergone a Turkish reliability and validity study. Therefore, our study was conducted to adapt the LASA-SBQ into Turkish. After the Turkish translation of this questionnaire, a validity and reliability study was conducted.

Materials and methods

Prior to the study, the permission of Marjolein Visser, the developer of the LASA-SBQ, was obtained by e-mail. This study adhered to the principles of the Declaration of Helsinki and was approved by the Manisa Celal Bayar University, Faculty of Medicine, Health Sciences Ethics Committee (Ethics Committee No: 07/12/2022 / 20.478.486 / 1609). After the participants were informed (purpose of the study, methods, possible risks and benefits, protection of personal data and contact information), written consent was obtained that they volunteered to participate in the study, and then data collection was carried out.

The study included 100 volunteer participants who met the inclusion criteria among the patients and their relatives living in Manisa Nursing Home Foundation Abdürrahim Ot Suphi Egemen Economic Enterprise Nursing Home and Manisa Municipality İsmail Muammer Cider Nursing Home and who came to Manisa Celal Bayar University Hafsa Sultan Hospital for treatment or visit. The inclusion criteria were being 65 years of age or older and volunteering by signing and approving the informed consent form for participation in the study. The exclusion criteria were not meeting the inclusion criteria, not answering any questions despite signing and approving the informed consent form, Mini Mental State Examination (rMMSE-T) having a score of 22 points or less for educated and 18 points or less for uneducated, having a score of 60 points or less on the Barthel Index (BI), and having a neurological or orthopedic disease that would prevent the participant's independence. Elderly

individuals who did not volunteer to be included in the study by giving written consent ($n = 32$), who were unable to choose sedentary behaviour by their own choice due to their mental level ($n = 2$; dementia), functional independence level ($n = 2$; inpatient care and treatment), and orthopedic ($n = 2$; fracture, presence of advanced rheumatic disease) or neurological ($n = 2$; hemiplegia, Parkinson's disease) disorders were not included in the study.

Beaton translation protocol was applied in our study for adaptation of the LASA-SBQ into Turkish [21]. In the study, the original questionnaire was translated into Turkish by two native Turkish speakers with advanced English proficiency. Afterwards, these two translations were converted into a single common translation and translated back into English by two native English speakers with advanced level of Turkish. The obtained English form was compared with the original version of the questionnaire and the questionnaires were harmonised. After answering the questionnaire, the participants were asked about the comprehensibility of the questionnaire questions, how the questions could be clearer, whether there were any statements that bothered them or that they wanted to add, and feedback was obtained. The second and tenth questions were amended. The second question was amended as 'Reading while reading or lying down, spending time using phones and tablets (social media, surfing, playing games, etc.)' and the tenth question as 'Visiting a place of worship or theatre (cinema)'. Based on the pilot study, necessary arrangements were made without any change in the meaning of the questionnaire and cultural adaptation of the questionnaire was ensured. After the pilot study, the questionnaire was administered to elderly individuals aged 65 years and over with the final form.

Marx et al. have shown that there is no difference between 2 days and 2 weeks in terms of scale results in terms of test-retest reliability in the test-retest reliability studies of health-related instruments [22]. In addition, Kara Kaya et al. completed the second evaluation of the questionnaires after 7 days, Rosenberg et al. after 2 weeks and Visser et al. after 23 days [20, 23, 24]. According to abovementioned studies, for test-retest reliability, the individuals to whom the test was applied were re-evaluated at least 7 and at most 14 days later.

Data were collected with face-to-face interview technique and data recording form for an average of 15–20 min. The data recording form included Demographic Information Form, rMMSE-T, BI, LASA-SBQ, Sedentary Behavior Questionnaire (SBQ), Epworth Sleepiness Scale (ESS) and International Physical Activity Questionnaire Short Form (IPAQ-SF).

With the demographic information form, year of birth/age, gender, education level, height, body weight and drug use were recorded.

Mini Mental State Examination was developed by Folstein [25] and standardised by Molloy et al. [26]. Its Turkish validity and reliability as a dementia screening test has been performed in educated and uneducated elderly individuals. Orientation 0–10, recording memory 0–3, attention and processing 0–5, recall 0–3, language 0–9. The threshold value was found to be 22 for the educated and 18 for the uneducated. The internal consistency of the Turkish version of the scale was found to be 0.71 and the intraobserver and interobserver reliabilities were found to be 0.96 and 0.85 [27].

Mahoney and Barthel developed the BI in 1965 [28]. Its Turkish reliability was performed in 2000 [29]. The BI is a scale that evaluates the steps of activities of daily living under 10 subheadings. 0–20 points define complete dependence, 21–61 points define severe dependence, 62–90 points define moderate dependence, 91–99 points define mild dependence, and 100 points define independence. In studies using the BI, 60 points were taken as the limit and scores 61 and above indicate the ability to function independently. Internal consistency was found to be 0.93 for stroke and 0.88 for spinal cord injury [28, 29].

The LASA-SBQ consists of 10 questions questioning sedentary behaviors including sitting, lying down and napping. Individuals are asked how long they maintain the behaviors specified in the questionnaire. The duration is evaluated separately as weekdays and weekends. The 24-hour average time spent for each sedentary behavior is recorded in hours and/or minutes. It was developed by Visser et al. [20].

The SBQ is a questionnaire developed to assess the time spent performing nine different sedentary behaviors separately on weekdays and weekends. The time spent for each behavior is recorded in hours. For the total score, sedentary time in hours is summed separately for weekdays and weekends and sedentary behavior times are obtained [23]. In the original version of the SBQ questionnaire, Rosenberg et al. found that the total weekly duration of sedentary behaviour was 64.6 ± 26.7 in women and 66.6 ± 24.9 in men. In the same study, the duration of sedentary behaviour on a weekday was found to be 10.3 ± 4.6 for women and 9.0 ± 3.9 for men, and the duration of sedentary behaviour on a weekend day was found to be 8.8 ± 3.9 for women and 10.8 ± 4.0 for men [23]. In the study in which the Turkish version of the questionnaire was adapted, Kara Kaya et al. found that the duration of sedentary behaviour of the participants on a weekday was 12.22 ± 4.94 and on a weekend day was 12.57 ± 4.68 [24].

ESS was developed by Johns in 1991 [30]. ESS, is a Likert-type scale answered between 0 and 3 points and higher scores indicate an increased level of sleepiness. The scale contains 8 items and a total of 0–5 points indicate normal sleepiness, 6–10 points indicate normal but

increased sleepiness, 11–12 points indicate moderate sleepiness, 13–15 points indicate moderate sleepiness and 16–24 points indicate severe sleepiness [31]. Turkish adaptation of the scale was performed by Izci et al. and Cronbach α internal consistency coefficient was found to be 0.86 and test-retest reliability was found to be 0.81 [32].

Physical activity levels were questioned with the IPAQ-SF, a 7-question International Physical Activity Questionnaire [33, 34]. Reliability and validity study of the Turkish version was performed by Saglam et al. in individuals aged 18–32 years [35]. It evaluates the activities performed in the last week and the sitting time on weekdays and weekends. Data are expressed as MET min/week. Individuals can be divided into low, moderate and high physical activity levels based on the physical activity levels specified in the questionnaire guide. The test-retest reliability coefficient of the scale was 0.69 and the correlation values for co-validity were determined as 0.30–0.49 with accelerometer measurements, 0.25 with walking activity and 0.29 with vigorous physical activity [33–35].

Statistical analysis

The demographic data, sedentary behavior levels, physical activity levels and independence level in activities of daily living of the research group were expressed as minimum and maximum values, mean, standard deviation and percentage distributions in accordance with the data structure of the variables. IBM SPSS Statics version 26.0 software was used for statistical analyses of the findings obtained in the study. The conformity of the variables to normal distribution was analysed by Kolmogorov-Simirnov/Shapiro-Wilk tests.

For scale validity, the correlation coefficient of the LASA-SBQ and SBQ scores were calculated. Correlation coefficients between weekday and weekend scores, which are sub-dimensions of the LASA-SBQ, were calculated. In addition, the correlations between weekday, weekend and total scores of the LASA-SBQ questionnaire and the IPAQ-SF and ESS were also analysed. In our study, Bland-Altman plot was drawn to evaluate the convergent validity. The differences and averages of LASA-SBQ and SBQ total scores were calculated, and then the lower and upper limits of the graph were determined with 95% confidence intervals. The difference between LASA-SBQ and SBQ total scores was analysed by one sample t test and no statistically significant difference was found. As a result of the lack of significant difference, a Bland-Altman graph was created. Afterwards, linear regression analysis was performed to evaluate whether there was bias in the measurement tools.

Test-retest method was applied for questionnaire reliability and the intraclass correlation coefficient between initial and final scores was calculated. Correlation analyses were performed with Pearson/Spearman tests according to the suitability of the data structure and normal distribution. In correlation analyses, $p < 0.05$ was accepted for statistical significance.

Results

The study included 100 participants aged 65 years and over, 50 of whom were women. The mean age of the participants was 73.480 ± 8.032 years (median: 71.00; Fig. 1). The mean weekday sedentary time of the participants was 9.322 ± 3.724 h, the mean weekend sedentary time was 9.557 ± 3.799 h, and the mean weekly sedentary time was 9.390 ± 3.733 h (Table 1).

Participants were compared by dividing them into the groups of low, medium and high IPAQ-SF; ESS no sleepiness, increased sleepiness and pathological sleepiness; and with and without drug use. As a result of the analyses, no statistically significant difference was found in the total scores of LASA-SBQ between the IPAQ-SF, ESS and drug use groups. The results of the analyses are shown in Table 2.

For the convergent and divergent validity of the questionnaire, correlation analyses were performed between the LASA-SBQ weekday, weekend and total scores, and with the ESS, IPAQ-SF, SBQ weekday and weekend scores. As a result of the analysis, Pearson $r = 0.747$ ($p < 0.01$), $r = 0.771$ ($p < 0.01$) and $r = 0.757$ ($p < 0.01$) correlations were obtained between LASA-SBQ total score and SBQ weekday, weekend and total scores, respectively. The results of the concurrent validity analysis are presented in Table 3. In the validity analysis, Bland-Altman analysis was also performed and a graph was created. The scatter plot shows that LASA-SBQ and SBQ questionnaires are correlated. As a result of the regression analysis, the non-standardised B coefficient of the LASA-SBQ and SBQ questionnaire averages was 0.51 and the significance value was $p = 0.497$. Accordingly, it was concluded that there was no bias in the measurement tools (Fig. 2).

Test-retest method was applied to evaluate the invariance of the scale over time. The test was repeated seven to fourteen days after the first test. When the test-retest reliability was analysed, the intraclass correlation coefficient of the LASA-SBQ total score was found to be 0.954. The intraclass correlation coefficient of the weekday dimension of the scale was 0.976, while the intraclass correlation coefficient of the weekend dimension was 0.978.

Discussion

In our study, LASA-SBQ was translated into Turkish and culturally adapted. Psychometric properties of the questionnaire were examined and validity and reliability analyses were performed. In our study, 50% of the individuals over 65 years of age had a low level of physical activity,

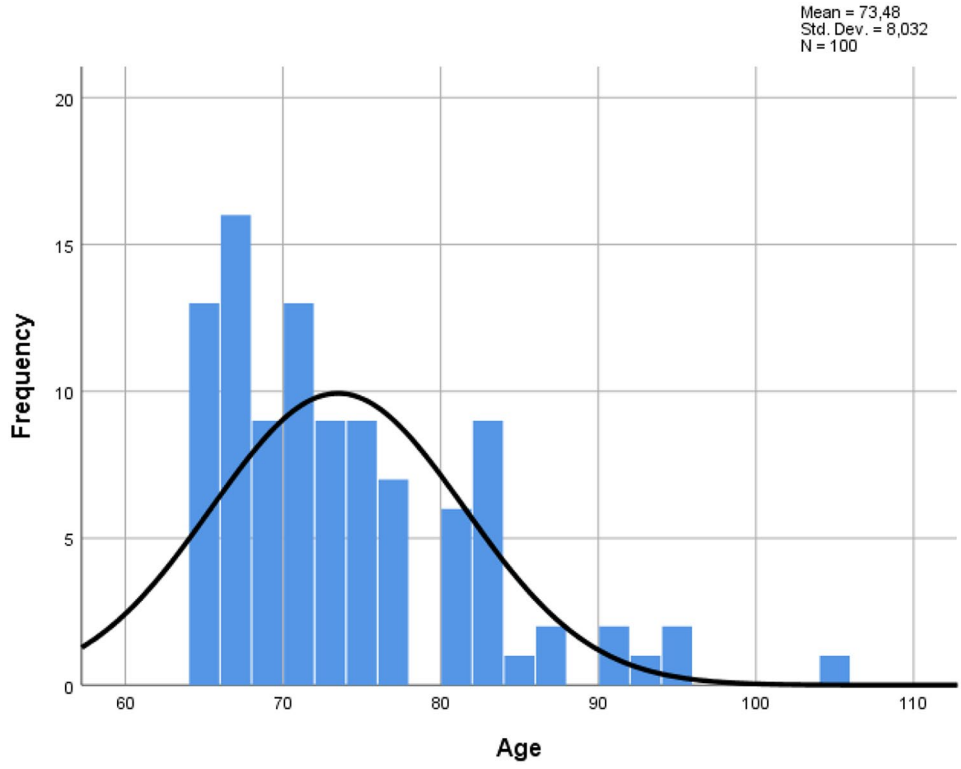

Fig. 1 Age distribution histogram

87% did not suffer from sleepiness and 89% did not use medication. LASA-SBQ scores did not differ according to physical activity level, sleepiness and medication use ($p > 0.05$). The validity of the questionnaire was analysed together with SBQ and Bland-Altman analysis was performed and a graph was drawn. The Bland-Altman graph shows that the questionnaire has a high co validity. In the discriminant validity, ESS and IPAQ-SF were used and no correlation was found between LASA-SBQ and these questionnaires. The reliability of the questionnaire over time was examined and the intraclass correlation coefficient calculated by the test-retest method was found to be 0.954.

In the validity and reliability studies of the LASA-SBQ, SBQ English and SBQ Spanish versions, the researchers examined the questionnaire validity by comparing the results of the sedentary behavior questionnaires they used with accelerometer data. The data obtained with the accelerometer were considered to be objective and used as a reference. However, no correlation was found between the questionnaires and accelerometer data in these studies. This situation is interpreted to be due to the fact that accelerometers and questionnaires do not measure the same data [20, 23, 36]. In our study, the correlation between LASA-SBQ and SBQ was calculated and their co-validity was analysed. The weekday, weekend and total correlation values of LASA-SBQ and SBQ were found to be 0.748, 0.774 and 0.757, respectively.

The original questionnaire included 83 men and women aged 65–92 years, who completed a questionnaire with ten sedentary activities and wore an accelerometer for 8 days. The fact that Visser et al. evaluated with an accelerometer causes the correlation value to be low. We compared our study with the SBQ and the correlation value is high because both questionnaires are self-report scales [20].

Kara Kaya et al. conducted a Turkish validity and reliability study of SBQ and adapted the form to Turkish. In their study, they found a weak correlation between the SBQ and the sitting section of the IPAQ-SF short form ($r = 0.265$) [24]. Rosenberg et al. also analysed the correlations between IPAQ-SF and SBQ in the English version of SBQ. In the results they obtained, they found correlations between the SBQ transport item and IPAQ-SF with a value of $r = 0.54$ in male participants and $r = 0.44$ in female participants [23]. In our study, the correlation between LASA-SBQ and the total score of IPAQ-SF was analysed and no significant correlation was found between weekdays, weekends and total score.

In the Bland-Altman analysis, the validity of the questionnaire together with the SBQ was examined and a graph was drawn. In the graph, the mean value was found to be 2.15, and the lower and upper limits of the 95% confidence interval were found to be 37.095 and −32.795, respectively. When the graph is analysed, it is seen that the distribution is within the 95% confidence interval

Table 1 Participants' demographic data and questionnaire scores

	Minimum Value	Maximum Value	Mean	Standard Deviation
Age (year)	65	105	73.480	8.032
BMI (kg/m^2)	14.692	42.222	26.274	4.692
rMMSE-T	22	30	26.910	2.621
BI	70	100	94.550	8.764
ESS	0	14	4.550	3.574
IPAQ-SF (MET-min/week)	0	10,773	1256.710	1692.842
LASA-SBQ Weekdays (hour)	3	17	9.322	3.724
LASA-SBQ Weekend (hour)	3.25	17	9.557	3.799
LASA-SBQ Total (hour)	0	17	9.390	3.733
SBQ Weekdays (hour)	15	107.5	45.237	18.086
SBQ Weekend (hour)	6	36.5	18.340	7.011
		n	%	
Gender	Male	50	50	
	Female	50	50	
Education	None	18	18	
	Primary School	37	37	
	Secondary School	9	9	
	High School	18	18	
	University	18	18	
IPAQ-SF	Low	50	50	
	Moderate	38	38	
	High	12	12	
ESS	None	87	87	
	Increased Sleepiness	13	13	
Drug Use	Yes	89	89	
	No	11	11	

BMI: Body Mass Index, rMMSE-T: Mini Mental State Examination, BI: Barthel Index ESS: Epworth Sleepiness Scale, IPAQ-SF: International Physical Activity Questionnaire Short Form, LASA-SBQ: The Longitudinal Aging Study Amsterdam Sedentary Behavior Questionnaire, SBQ: Sedentary Behavior Questionnaire

limits. Bland-Altman graph shows that the validity of LASA-SBQ is high. Visser et al. drew the Bland-Altman plot by comparing the results of LASA-SBQ and accelerometer. They concluded that the average difference between the two measurements was 2.1 h. In our study, Bland-Altman graph was drawn by comparing LASA-SBQ and SBQ results. As can be seen from the graph, the mean difference between the two surveys is close to zero. As a result of the graph, Visser et al. concluded that individuals with low levels of sedentary behavior consider their sedentary behavior less important, whereas individuals with high levels of sedentary behavior consider their sedentary behavior more important than it is. Since two similar questionnaires were used in our study, the results were distributed more homogenously. In the graph we drew, it is seen that the LASA-SBQ and SBQ responses of individuals with sedentary behavior are similar and do not cluster or form a trend [20]. The fact that the differences of the survey averages are very close to zero in this graph shows that the LASA-SBQ and SBQ measurement results are similar to each other. In addition, the graph shows that the measurement results are within the 95% confidence interval. These data can be considered as an important indicator in terms of validity.

Since our questionnaire is not a likert-type questionnaire and gives results as continuous data, the internal consistency coefficient could not be calculated. Instead, the reliability of the questionnaire was evaluated by test-retest method. Visser et al. examined the test-retest reliability of the LASA-SBQ in 63 participants in the 6 sedentary activities that gave the best results in the questionnaire. While the test-retest reliability of the items questioning these 6 activities was found to be 0.71 (95% CI 0.57–0.81), this value was between 0.31 and 0.85 when the items were analysed individually [20]. Kara Kaya et al. found test-retest, weekday total and weekend total reliabilities of 0.83, 0.831 and 0.761, respectively [24]. Rosenberg et al. found the test-retest reliability for weekdays and weekends to be 0.848 and 0.770, respectively [23].

Munguia-Izquiredo et al. found test-retest, weekday total and weekend total reliabilities of 0.86, 0.83 and 0.83, respectively [37]. In our study, retest was performed

Table 2 Comparison of LASA-SBQ scores of participants according to physical activity, sleepiness and drug use

	Subgroup	LASA-SBQ Mean	LASA-SBQ Standard Deviation	*p*
Physical activity level (One-Way ANOVA)	Low	9.835	3.863	0.490
	Moderate	8.899	3.836	
	High	9.086	2.750	
Sleepiness (Student t test)	None	9.289	3.763	0.490
	Increased Sleepiness	10.060	3.594	
Drug Use (Student t test)	No	7.691	3.903	0.110
	Yes	9.600	3.679	

LASA-SBQ: The Longitudinal Aging Study Amsterdam Sedentary Behavior Questionnaire

Table 3 LASA-SBQ co-validity analysis

	LASA-SBQ Weekdays (hour)	LASA-SBQ Weekend (hour)	ESS	IPAQ-SF	SBQ Weekdays (hour)	SBQ Weekend (hour)	SBQ Total (hour)
LASA-SBQ Weekdays (hour)	-	0.983*	0.186	-0.150	0.748*	0.766*	0.757*
LASA-SBQ Weekend (hour)	0.983*	-	0.157	-0.162	0.737*	0.774*	0.751*
LASA-SBQ Total (hour)	0.999*	0.991*	0.178	-0.154	0.747*	0.771*	0.757*

LASA-SBQ: The Longitudinal Aging Study Amsterdam Sedentary Behavior Questionnaire, ESS: Epworth Sleepiness Scale, IPAQ-SF: International Physical Activity Questionnaire Short Form, SBQ: Sedentary Behavior Questionnaire. Correlations are given as Pearson r values. *: <0.05

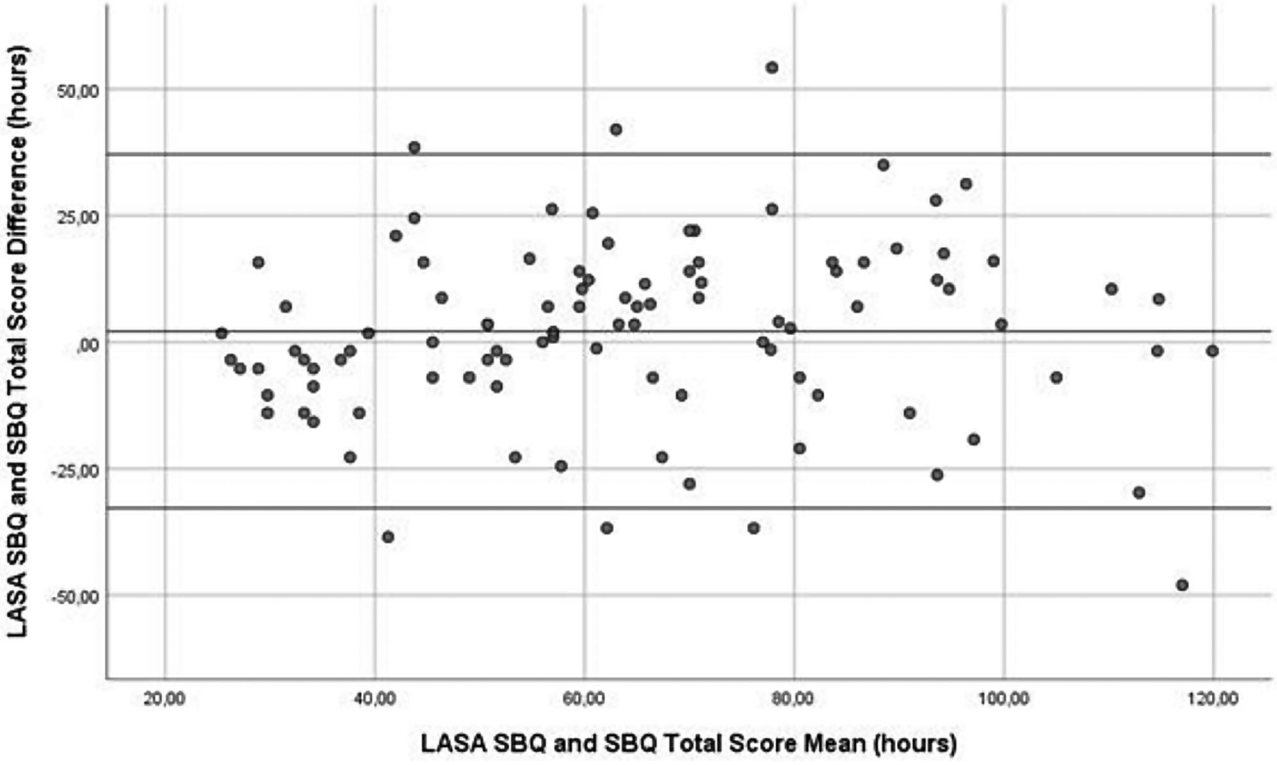

Fig. 2 Bland altman plot for LASA-SBQ and SBQ co-validity analysis. LASA-SBQ: The Longitudinal Aging Study Amsterdam Sedentary Behavior Questionnaire, SBQ: Sedentary Behavior Questionnaire

within 7–14 in all participants. The intraclass correlation coefficient was calculated for the total, weekday and weekend scores of the questionnaire. The intraclass correlation coefficients were found to be 0.954, 0.976 and 0.978, respectively. As a result, the test-retest reliability of the Turkish version of the scale can be accepted as high.

Limitations

When the limitations of our study are analysed, there are two main limitations. Firstly, we did not use an accelerometer. However, the most important disadvantages of using accelerometers are high cost, difficulty in applying to a large number of people, Hawthorne effect and the lack of a precise protocol on this subject. Attention has even been drawn to the development of methods that allow the combined use of accelerometry and questionnaires [19]. This point is associated with the fact that sedentary behaviour is multidimensional and the two methods examine different aspects of sedentary behaviour in the assessment. Also, during the application with this type of device, the slippage that may occur during the placement of the device and the difficulty in making measurements with clothing. On the otherhand, problems that may be experienced on the skin with the use of the device are also mentioned in the literature [38].

Another limitation of our study is that the mean difference between LASA-SBQ and SBQ is wider than the study of Visser et al. [20]. In the single sample test between the LASA SBQ and SBQ questionnaires, the mean was 2.15 and the standard deviation was 17.829. When the Bland Altman graph was created and the limits of agreement were determined at 95% confidence

interval, 95% CI Upper: 37,09507549; 95% CI Lower: -32,79507549 were calculated. However, 93% of the data are within the limits of aggrement. At this point, these two limitations should be taken into consideration when interpreting the research data.

Conclusion

As a result, the LASA-SBQ was translated into Turkish and culturally adapted in individuals over 65 years of age. The psychometric properties of the questionnaire were examined and validity and reliability analyses were performed. The Turkish version of the LASA-SBQ is a valid and reliable scale for individuals over 65 years of age and is suitable for use in scientific research.

Abbreviations

LASA-SBQ	The Longitudinal Aging Study Amsterdam Sedentary Behavior Questionnaire
SBQ	Sedentary Behavior Questionnaire
rMMSE-T	Mini Mental State Examination
BI	Barthel Index
ESS	Epworth Sleepiness Scale
IPAQ-SF	International Physical Activity Questionnaire Short Form

Acknowledgements

Not applicable.

Author contributions

M.M., G.C., D.I.G., and E.S.A. designed the study, collected and analyzed data, wrote and revised the manuscript.

Funding

This study was supported by TUBITAK within the scope of TUBITAK-2209-A University. Students Research Projects Support Program for the 2nd Period of 2022 (Number 1919B012223022).

Data availability

The data used during the current study are available from the corresponding author onreasonable request.

Declarations

Ethics statement and consent to participate

This study adhered to the principles of the Declaration of Helsinki and was approved by the Manisa Celal Bayar University, Faculty of Medicine, Health Sciences Ethics Committee (Ethics Committee No: 07/12/2022 / 20.478.486 / 1609). After the participants were informed (purpose of the study, methods, possible risks and benefits, protection of personal data and contact information), written consent was obtained that they volunteered to participate in the study, and then data collection was carried out.

Consent for publication

Not applicable.

Clinical trial number

Not applicable.

Competing interests

The authors declare no competing interests.

Received: 20 September 2024 / Accepted: 6 February 2025
Published online: 14 February 2025

References

1. Tremblay MS, Aubert S, Barnes JD, Saunders TJ, Carson V, Latimer-Cheung AE, et al. Sedentary Behavior Research Network (SBRN) - terminology Consensus Project process and outcome. Int J Behav Nutr Phys Act. 2017;14(1):75. https://doi.org/10.1186/s12966-017-0525-8.
2. Hadgraft NT, Winkler E, Climie RE, Grace MS, Romero L, Owen N, et al. Effects of sedentary behaviour interventions on biomarkers of cardiometabolic risk in adults: systematic review with meta-analyses. Br J Sports Med. 2021;55(3):144–54. https://doi.org/10.1136/bjsports-2019-101154.
3. Schutzer KA, Graves BS. Barriers and motivations to exercise in older adults. Prev Med. 2004;39(5):1056–61. https://doi.org/10.1016/j.ypmed.2004.04.003.
4. Dishman RK. Motivating older adults to exercise. South Med J. 1994;87(5):S79–82. https://doi.org/10.1097/00007611-199405000-00015.
5. T.C. Sağlık Bakanlığı. Türkiye Halk Sağlığı Kurumu Türkiye Fiziksel Aktivite Rehberi. Ankara: Kuban Matbaacılık Yayıncılık; 2014. ISBN: 978-975-590-492-4.
6. Üner S, Balcılar M, Ergüder T. Türkiye hane halkı sağlık araştırması: bulaşıcı olmayan hastalıkların risk faktörleri prevalansı 2017 (STEPS). Ankara: Dünya Sağlık Örgütü Türkiye Ofisi; 2018. ISBN: 978-605-68577-0-6.
7. Rojer AGM, Ramsey KA, Trappenburg MC, van Rijssen NM, Otten RHJ, Heymans MW, Pijnappels M, Meskers CGM, Maier AB. Instrumented measures of sedentary behaviour and physical activity are associated with mortality in community-dwelling older adults: a systematic review, meta-analysis and meta-regression analysis. Ageing Res Rev. 2020;61:101061. https://doi.org/10.1016/j.arr.2020.101061.
8. Patterson R, McNamara E, Tainio M, de Sá TH, Smith AD, Sharp SJ, et al. Sedentary behaviour and risk of all-cause, cardiovascular and cancer mortality, and incident type 2 diabetes: a systematic review and dose response meta-analysis. Eur J Epidemiol. 2018;33(9):811–29. https://doi.org/10.1007/s10654-018-0380-1.
9. Lee PG, Jackson EA, Richardson CR. Exercise prescriptions in older adults. Am Fam Physician. 2017;95(7):425–32.
10. Falck RS, Davis JC, Liu-Ambrose T. What is the association between sedentary behaviour and cognitive function? A systematic review. Br J Sports Med. 2017;51(10):800–11. https://doi.org/10.1136/bjsports-2015-095551.
11. Schuch FB, Vancampfort D, Firth J, Rosenbaum S, Ward PB, Reichert T, et al. Physical activity and sedentary behavior in people with major depressive disorder: a systematic review and meta-analysis. J Affect Disord. 2017;210:139–50. https://doi.org/10.1016/j.jad.2016.10.050.
12. Belice T, Bölükbaşı S, Mandıracıoğlu A. Yaşlılarda fiziksel inaktivitenin yaşam kalitesi üzerine etkileri. Celal Bayar Üniversitesi Sağlık Bilim Enstitüsü Derg. 2021;8(1):44–8. https://doi.org/10.34087/cbusbed.758231.
13. Levinger P, Hill KD. Are the recommended physical activity guidelines practical and realistic for older people with complex medical issues? J Geriatr Phys Ther. 2021;44(1):2–8. https://doi.org/10.1519/JPT.0000000000000291.
14. Boulton ER, Horne M, Todd C. Multiple influences on participating in physical activity in older age: developing a social ecological approach. Health Expect. 2018;21(1):239–48. https://doi.org/10.1111/hex.12608.
15. Wullems JA, Verschueren SM, Degens H, Morse CI, Onambélé GL. A review of the assessment and prevalence of sedentarism in older adults, its physiology/health impact and non-exercise mobility counter-measures. Biogerontology. 2016;17(3):547–65. https://doi.org/10.1007/s10522-016-9640-1.
16. Bakker EA, Hartman YAW, Hopman MTE, Hopkins ND, Graves LEF, Dunstan DW, et al. Validity and reliability of subjective methods to assess sedentary behaviour in adults: a systematic review and meta-analysis. Int J Behav Nutr Phys Act. 2020;17(1):75. https://doi.org/10.1186/s12966-020-00972-1.
17. Busschaert C, De Bourdeaudhuij I, Van Holle V, Chastin SF, Cardon G, De Cocker K. Reliability and validity of three questionnaires measuring context-specific sedentary behaviour and associated correlates in adolescents, adults and older adults. Int J Behav Nutr Phys Act. 2015;12(1):117. https://doi.org/10.1186/s12966-015-0277-2.
18. Mañas A, del Pozo-Cruz B, García-García FJ, Guadalupe-Grau A, Ara I. Role of objectively measured sedentary behaviour in physical performance, frailty and mortality among older adults: a short systematic review. EJSS. 2017;17:940–53. https://doi.org/10.1080/17461391.2017.1327983.
19. Sansano-Nadal O, Wilson JJ, Martín-Borràs C, Brønd JC, Skjødt M, Caserotti P, et al. Validity of the sedentary behavior questionnaire in European older adults using English, Spanish, German and Danish versions. Meas Phys Educ Exerc Sci. 2022;26(1):1–14. https://doi.org/10.1080/1091367X.2021.1922910.
20. Visser M, Koster A. Development of a questionnaire to assess sedentary time in older persons–a comparative study using accelerometry. BMC Geriatr. 2013;13(1):1–8. https://doi.org/10.1186/1471-2318-13-80.

21. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine. 2000;25(24):3186–91. https://doi.org/10.1097/00007632-200012150-00014.
22. Marx RG, Menezes A, Horovitz L, Jones EC, Warren RF. A comparison of two time intervals for test-retest reliability of health status instruments. J Clin Epidemiol. 2003;56(8):730–5. https://doi.org/10.1016/S0895-4356(03)00084-2.
23. Rosenberg DE, Norman GJ, Wagner N, Patrick K, Calfas KJ, Sallis JF. Reliability and validity of the sedentary behavior questionnaire (SBQ) for adults. J Phys Act Health. 2010;7(6):697–705. https://doi.org/10.1123/jpah.7.6.697.
24. Kara Kaya B, Zengin Alpözgen A. Sağlıklı yetişkinler için sedanter davranış anketinin Türkçe kültürel adaptasyonu ve güvenirliği. Spor ve Performans Araştırmaları Dergisi. 2021;8(4):683–90. https://doi.org/10.34087/cbusbed.931301.
25. Folstein MF, Folstein SE, McHugh PR. Mini-mental state: a practical method for grading the cognitive state of patients for the Clinician. J Psychiatr Res. 1975;12:189–98.
26. Molloy DW, Alemayehu E, Roberts R. Reliability of a standardized Mini-mental State examination compared with the traditional mini-mental state examination. Am J Psychiatry. 1991;148(1):102–5. https://doi.org/10.1176/ajp.148.1.102.
27. 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):1242–50. https://doi.org/10.1002/gps.2252.
28. Mahoney FI, Barthel DW. Functional evaluation: the Barthel Index. Md State Med J. 1965;14:61–5.
29. Küçükdeveci AA, Yavuzer G, Tennant A, Süldür N, Sonel B, Arasil T. Adaptation of the modified Barthel Index for use in physical medicine and rehabilitation in Turkey. Scand J Rehabil Med. 2000;32(2):87–92. https://doi.org/10.1080/003655000750045604.
30. Johns MW. A new method for measuring daytime sleepiness: the Epworth Sleepiness Scale. Sleep. 1991;14(6):540–5.
31. Ağargün MY, Çilli AS, Kara H, Bilici M, Telcioğlu M, Semiz ÜB, et al. Epworth Uykululuk Ölçeği'nin geçerliği ve güvenirliği. Türk Psikiyatri Derg. 1999;10(4):261–7.
32. Izci B, Ardic S, Firat H, Sahin A, Altinors M, Karacan I. Reliability and validity studies of the Turkish version of the Epworth Sleepiness Scale. Sleep Breath. 2008;12(2):161–8. https://doi.org/10.1007/s11325-007-0145-7.
33. International Physical Activity Questionnaire (IPAQ). Available from: www.ipaq.ki.se. Accessed 18 November 2022.
34. Craig CL, Marshall AL, Sjöström M, Bauman AE, Booth ML, Ainsworth BE, et al. International physical activity questionnaire: 12-country reliability and validity. Med Sci Sports Exerc. 2003;35(8):1381–95. https://doi.org/10.1249/01.MSS.0000078924.61453.FB.
35. Saglam M, Arikan H, Savci S, Inal-Ince D, Bosnak-Guclu M, Karabulut E, et al. International physical activity questionnaire: reliability and validity of the Turkish version. Percept Mot Skills. 2010;111(1):278–84. https://doi.org/10.2466/06.08.PMS.111.4.278-284.
36. Prince SA, LeBlanc AG, Colley RC, Saunders TJ. Measurement of sedentary behaviour in population health surveys: a review and recommendations. Peer J. 2017;5. https://doi.org/10.7717/peerj.4130.
37. Munguia-Izquierdo D, Segura-Jimenez V, Camiletti-Moirón D, Alvarez-Gallardo IC, Estévez-López F, Romero A, et al. Spanish adaptation and psychometric properties of the sedentary Behaviour Questionnaire for fibromyalgia patients: the Al-Andalus study. Clin Exp Rheumatol. 2013;31(6 Suppl 79):22–33. PMID: 23710552.
38. Van Der Berg JD, Stehouwer CDA, Bosma H, Van Der Velde JHPM, Willems PJB, Savelberg HHCM, et al. Associations of total amount and patterns of sedentary behaviour with type 2 diabetes and the metabolic syndrome: the Maastricht study. Diabetologia. 2016;59(4):709–18. https://doi.org/10.1007/s00125-015-3861-8.

Publisher's note