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Original Research

Cross-cultural Adaptation of the Activity Questionnaire for Adults and Adolescents into Turkish and Investigation of its Validity and Reliability

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ABSTRACT

Objective: The Activity Questionnaire for Adults and Adolescents (AQuAA) is used to evaluate physical activity (PA) levels in different age groups. Its validity and reliability in the Turkish language have not been studied yet. This study aims to adapt the AQuAA into Turkish and to investigate its validity and reliability.

Methods: A total of 124 volunteers were included in the study. After the Turkish adaptation of AQuAA, the AQuAA-Tr version was administered to the volunteers for test-retest reliability twice, with an interval of two weeks, and the International Physical Activity Questionnaire Short Form (IPAQ-SF) for criterion validity. For construct validity, the step counts of the volunteers were followed for two weeks with the Samsung Health® smartphone pedometer application. The reliability of the AQuAA-Tr was evaluated with intra-class correlation coefficients (ICC). Spearman correlation coefficients (r) were used to analyze the relationships between continuous variables.

Results: A total of 72 adolescents (51 females and 21 males, mean age 14.5 ± 0.1 years) and 52 young adults (32 females and 20 males, mean age 25.8 ± 1.3 years) participated in the test-retest reliability and criterion validity study. Thirty-four adolescents (26 female, 8 male, mean age 14.7 ± 0.2 years) and 39 young adults (27 female, 12 male, mean age 25.6 ± 1.5 years) were included in the construct validity study. The test-retest reliability of the questionnaire was in the range of strong to very strong (ICC = 0.704 to 0.982) in adolescents and moderate to strong (ICC = 0.606 to 0.851) in adults for different levels of PA. In the context of the criterion validity, although there were moderate to strong correlations (r = 0.413 to 0.768) between some PA levels of the IPAQ-SF and AQuAA-Tr in adolescents and moderate correlations (r = 0.422 to 0.525) in adults, the correlations were mostly weak or negligible. In relation to construct validity, although there were moderate correlations (r = 0.435 to 0.504) between the Samsung Health® data and some PA levels of the AQuAA-Tr in adults, the correlations were mostly weak or negligible. There were no correlations between the Samsung Health® data and AQuAA-Tr in adolescents.

Conclusion: The reliability of the AQuAA-Tr was confirmed in both adolescents and adults. However, the criterion and construct validity of the AQuAA-Tr were not confirmed for either adolescents or adults. Introducing a PA questionnaire, which can provide detailed information about sedentary, light, moderate, and vigorous PA scores separately and total PA scores and allows the evaluation of PA in different categories, into our language is considered beneficial. Yet, the results of AQuAA-Tr should be interpreted carefully in the clinic.

Keywords: Physical Activity, Surveys and Questionnaires, Adult, Adolescent, Turkish People.

INTRODUCTION

Evidence regarding the risks of a sedentary lifestyle and the gains of regular physical activity (PA) on health outcomes is now well known [1]. With the increase in people's PA levels, there is a significant decrease in the risk of diabetes mellitus (DM), stroke, cancer (especially breast and colon), and heart disease [2]. PA assessment is important in terms of understanding the relationships between PA and health, as well as assessing the effectiveness of PA interventions [3]. PA questionnaires are the most frequently used assessment tools for epidemiological, cross-sectional, surveillance, and behaviour change studies on PA [4]. They are used to define the types and components of PA behaviours and are conducted as self-report tools or interviews [5].

Current evidence supports the findings that a sedentary lifestyle is associated with all-cause death, metabolic syndrome, cardiovascular disease, and type 2 DM [6, 7]. For this reason, the assessment of the time spent on certain sedentary lifestyle behaviours is also important within the scope of PA evaluation. However, very few PA questionnaires focus on sedentary lifestyle behaviour [8]. In addition, PA questionnaires are often designed for specific age groups, and therefore the main shortcoming of these questionnaires is that they do not allow comparison of PA levels across age groups [9]. Accordingly, there is a need for a PA questionnaire that can predict sedentary behaviours in a standard way as well as PA that can be used in dissimilar age groups.

The AQuAA is a PA questionnaire that provides data about the same PA variables in both adolescent and adult age groups. The aim of the AQuAA is to evaluate total and light, moderate, and vigorous PA as well as sedentary behaviours in both adolescents and adults [9]. This questionnaire is now widely used in the Netherlands to observe national trends in PA among young people or to evaluate PA interventions [10]. In Türkiye, the International Physical Activity Questionnaire (IPAQ) and its versions are widely used to evaluate PA in adults. However, as far as we know, there is no valid and reliable questionnaire used to evaluate PA, especially in adolescents. The validity and responsiveness of the AQuAA in overweight and obese pregnant women [11] and its psychometric properties in cancer patients [12] have already been studied. However, its validity and reliability in Turkish-speaking people have not yet been studied.

Main Points;

- The Turkish version of the Activity Questionnaire for Adults and Adolescents is a reliable physical activity questionnaire in both adolescents and adults.
- This is the first cross-cultural adaptation study of the Activity Questionnaire for Adults and Adolescents.
- This is the first study to evaluate the criterion validity of the Activity Questionnaire for Adults and Adolescents.

The aim of our study is to adapt the AQuAA, which was developed to evaluate the PA levels and effectiveness of interventions to increase PA in different age groups, into Turkish and to investigate its validity and reliability.

MATERIALS AND METHODS

Procedures

Before the study was initiated, necessary permission was obtained from the researchers who developed the AQuAA to adapt the questionnaire into Turkish and to investigate its validity and reliability, via e-mail. The study was carried out in Burdur/Türkiye between December 2017 and June 2019. The approval of the Burdur Mehmet Akif Ersoy University Non-Interventional Clinical Research Ethics Committee was obtained for the study (date: 07.02.2018, decision number: GO 2017/28). Informed consent of all individuals [parents of adolescents (because adolescents are under 18 years of age)] included in the study was obtained. In this study, first, the AQuAA was adapted into Turkish, and then its Turkish version (AQuAA-Tr) was applied to adolescents and adults and its validity and reliability were investigated.

Translation

The adaptation of the AQuAA into Turkish was performed according to a protocol recommended by the American Academy of Orthopaedic Surgeons (AAOS) for cross-cultural adaptation studies [13]. The questionnaire was first translated from the source language (English) into the target language (Turkish) by independent translators, whose mother tongue was the target language, who were bilingual, and who were unaware of the concepts examined in the assessment tool being adapted. A common translation was produced by analyzing the expressions that were difficult to understand and uncertainties of the questionnaire by a board of translators and an observer recording the process. In the next step, the Turkish version of the questionnaire was translated back into English by a translator who was completely blind to the original version of the questionnaire, was unaware of the concepts examined in the measurement tool,

did not have expertise in medicine, and was fluent in Turkish and a native speaker of English. No discrepancies or differences were found between the translations. Along with the original questionnaire, the materials produced during the translation phase were reviewed by a committee of experts involving academics, health professionals, and translators. The pre-final version of the questionnaire was administered to 10 volunteers as a pre-test. The final version of the questionnaire was created by interviewing the individuals who took the pre-test and replacing the difficult-to-understand expressions in the target language with more culturally appropriate ones.

Participants

As a general rule, a sample size of at least 50 subjects is acceptable for studies on the evaluation of the validity and reliability of measurement tools [14]. In sample selection, a weighted stratified sampling method was used, considering the gender and age distribution of the people in the institutions included in the study. We aimed to include 50 adolescents (volunteers among the students of Burdur/Merkez Mehmet Uzal Social Sciences High School and Suna Uzal Middle School) and 50 adults (volunteers among the staff and students of Burdur Mehmet Akif Ersoy University Burdur Health Services Vocational School and Faculty of Education) in this study. The voluntary individuals who did not have a physical disability or disease that limited their daily activities were included. Individuals with musculoskeletal problems that could change their PA habits, cardiorespiratory problems, and diabetes mellitus were excluded from the study. The test-retest reliability and criterion validity study was completed with 124 (72 adolescents, 52 adults) individuals, and the construct validity study was completed with 73 (34 adolescents, 39 adults) individuals. As a result of the study, a power value of 60% (r=0.219) was obtained for the correlation coefficient between total scores in adolescents and a power value of 72% (r=0.299) in adults.

Measurements

Sociodemographic information of all the individuals included in the study was recorded. For the test-retest reliability study, the AQuAA-Tr was administered to 72 adolescent and 52 adult individuals twice, with a two-week interval (the two-week time interval between the administrations was deemed long enough to prevent recall and short enough to avoid changes in the measured property). For the criterion validity study of the AQuAA-Tr, the IPAQ-SF was administered to 72 adolescent and 52 adult individuals. The relationships between sedentary, light, moderate, vigorous, and total activity scores obtained from the AQuAA-Tr and walking, moderate, vigorous, and total activity scores obtained from the IPAQ-SF were examined. For the construct validity study of the AQuAA-Tr, the step count data of 34 adolescent and 39 adult individuals was followed for two weeks on the smartphone pedometer application (Samsung Health®). The relationships between step counts obtained from Samsung Health® and sedentary, light, moderate, vigorous, and total activity scores obtained from the AQuAA-Tr were examined. Adolescents completed the questionnaires with their classmates under the supervision of a teacher and a physiotherapist in the classroom, while adults completed the questionnaires under the supervision of a physiotherapist. After the questionnaires were filled out, they were checked by a physiotherapist.

The Activity Questionnaire for Adults and Adolescents (AQuAA): The AQuAA is a PA questionnaire that measures both PA and sedentary behaviour, can be self-reported by adolescents and young adults, and is adequate for evaluating changes over short periods of time. It includes questions about different intensities of physical activities (light intensity, moderate intensity, and vigorous intensity) and examples of sedentary lifestyle behaviours and age-specific activities. Table 1 shows the cut-off values for activities of different intensities. Physical activities in the AQuAA are divided into five categories: commuting, work or school, household, leisure time, and active sports activities. For each activity, the duration, frequency, and perceived intensity are questioned. The AQuAA was developed by Chinapaw et al. [9].

The International Physical Activity Questionnaire Short Form (IPAQ-SF): The IPAQ was developed by a group of experts in 1998 to facilitate PA surveillance [15]. It has become the most widely used PA questionnaire today [16, 17] and has a long form (IPAQ-LF) and a short form (IPAQ-SF). The IPAQ-SF consists of seven questions about varying degrees of PA and sedentary behaviour within the past week. It allows the classification of a person's PA level in terms of MET*minute/week as walking, moderate, vigorous, and total. The Turkish validity and reliability study of this questionnaire was conducted by Sağlam et al. [18].

Step Count Tracking on the Smartphone Pedometer Application: Nolan et al. [19] reported that an iPhone®/iPod Touch® can assess movements with similar accuracy to other accelerometer-based tools. In addition, Manohar et al. [20] reported that a smartphone with an accelerometer is an accurate and reliable tool for assessing PA in a laboratory setting. In this context, Johnson

et al. [21] reported that the smartphone pedometer application (Samsung Health®) accurately measures steps in young adults during walking, regardless of where the smartphone is placed in the body. For this reason, we used the Samsung Health® smartphone pedometer application to evaluate the construct validity of the AQuAA-Tr. For step count tracking on the smartphone pedometer application, the participants were assisted to download and install a free pedometer application, Samsung Health®, on their smartphones. For two weeks in a row, the participants were instructed to carry the same smartphone in their pocket from soon after waking up until they fell asleep at the end of the day (except when taking a shower). In addition, the participants were taught how to see the total number of steps at the end of each day on the application, how to reset the counter, and how to record the data on the registration form. The application recorded the number of steps taken a day by the study participants for two weeks. Table 1 shows the cut-off values for activities of different intensities.

Table 1. Cut-off values for activities of different intensities [9].

Activity Intensity	Adolescents (< 18 year)		Adults (≥ 18 year)	
	MET Range	**Step Count**	**MET Range**	**Step Count**
Sedentary Activity	< 2	< 699	< 2	< 699
Light Activity	2 - 5	700 - 4478	2 - 4	700 - 3220
Moderate Activity	5 - 8	4479 - 8252	4 - 6.5	3221 - 6365
Vigorous Activity	≥ 8	≥ 8253	≥ 6.5	≥ 6366

MET: metabolic equivalent

Statistical Analysis

The statistical significance level was set at $p \leq 0.05$, and the Statistical Package of Social Sciences, version 24 for Windows (SPSS Inc, Chicago, Illinois, USA) program was used for data analysis. Continuous variables were expressed as mean ± standard deviation and categorical variables were presented using frequencies (n) and percentages (%). The reliability of the questionnaire was evaluated with intra-class correlation coefficients (ICC). The assumption of normal distribution was examined with the Shapiro Wilk test when the number of data was below 50 and with the Kolmogorov Smirnov test when the number of data was 50 and above. Spearman correlation coefficients (r) were used to analyze the relationships between continuous variables. The coefficients were interpreted as follows: 0.00-0.09, negligible; 0.10-0.39, weak; 0.40-0.69, moderate; 0.70-0.89, strong; 0.90-1.00, very strong [22].

RESULTS

Test-Retest Reliability Study

The AQuAA-Tr was administered to 72 adolescents [51 women (%70.8) and 21 men (%29.2) with a mean age of 14.5 ± 0.1 years] and 52 young adults [32 women (%61.5) and 20 men (%38.5) with a mean age of 25.8 ± 1.3 years] twice, two weeks apart, for the test-retest reliability. In adolescents, ICC was 0.982 for vigorous activity scores and ranged from 0.704 to 0.826 for sedentary, light, moderate, and total activity scores. In addition, it was found that the highest agreement was in vigorous activity scores, whereas the lowest agreement was in light activity scores in adolescents. In adults, ICC ranged from 0.709 to 0.851 for sedentary, light, vigorous, and total activity scores, and was 0.606 for moderate activity scores. In addition, it was found that the highest agreement was in vigorous activity scores, while the lowest agreement was in moderate activity scores in adults. Table 2 shows the AQuAA-Tr scores on the first and second tests (MET*min/week for activities of different intensities) and ICCs.

Criterion Validity Study

For the criterion validity study of the AQuAA-Tr, the IPAQ-SF was administered to 72 adolescents (51 women and 21 men with a mean age of 14.5 ± 0.1 years) and 52 young adults (32 women and 20 men with a mean age of 25.8 ± 1.3 years). A moderate correlation (Spearman Correlation coefficients (r)=0.413, 0.471, 0.500 and 0.660, respectively) was found between the sedentary, light, moderate, and vigorous activity scores of the AQuAA-Tr and vigorous activity scores of the IPAQ-SF in adolescents. However, a strong (r=0.768) correlation was found between the total PA scores of the AQuAA-Tr and the vigorous activity scores of the IPAQ-SF. Other correlations were weak or negligible. A moderate correlation (r=0.525, 0.423, respectively) was found between the light and total activity scores of the AQuAA-Tr and walking activity scores of the IPAQ-SF in adults. However, a moderate (r=0.42) correlation was found between the vigorous activity scores of the AQuAA-Tr and the vigorous activity scores of the IPAQ-SF. Other correlations were weak or negligible. Table 3 shows the correlations between the AQuAA-Tr and the IPAQ-SF.

Table 2. Test-retest correlations (ICCs) of the AQuAA-Tr scores for adolescents and adults

Adolescent (n=72)						
	Test 1 (test)		**Test 2 (re-test)**		**ICC**	**%95 C.I. for ICC**
	Mean ± SD	**Med (Min - Max)**	**Mean ± SD**	**Med (Min - Max)**		
Sedentary Activities (MET*min/week)	5274.05 ± 3321.41	5094 (0 - 15261)	5612.45 ± 3849.61	4917 (0 - 18257.2)	0.772	0.635 – 0.857
Light Activities (MET*min/week)	5874.58 ± 6370.37	3872 (315 - 28762.5)	5531.94 ± 6205.85	3351.75 (350 - 31692)	0.704	0.526 – 0.815
Moderate Activities (MET*min/week)	2655.54 ± 4589.28	810 (0 - 21420)	2649.43 ± 3876.34	967.5 (0 - 18361)	0.731	0.57 – 0.832
Vigorous Activities (MET*min/week)	2668.39 ± 3750.38	1160 (0 - 23200)	2716.39 ± 3831.2	1200 (0 - 23912)	0.982	0.972 – 0.989
Total AQuAA-T Score (MET*min/week)	16472.56 ± 12622.51	13587 (2440 - 58954.5)	16510.21 ± 13505.36	11962.25 (2257.5 - 72451.9)	0.826	0.721 – 0.891
Adult (n=52)						
	Test 1 (test)		**Test 2 (re-test)**		**ICC**	**%95 C.I. for ICC**
	Mean ± SD	**Med (Min - Max)**	**Mean ± SD**	**Med (Min - Max)**		
Sedentary Activities (MET*min/week)	5738.08 ± 3495.78	4920 (990 - 15990)	5510.73 ± 3120.93	5385.75 (660 - 12990)	0.709	0.493 – 0.833
Light Activities (MET*min/week)	5234.52 ± 4512.53	4168.5 (105 - 22312.5)	5517.06 ± 3843.69	4960.5 (306.5 - 18135)	0.752	0.569 – 0.858
Moderate Activities (MET*min/week)	1262.88 ± 3216.62	0 (0 - 20280)	774.62 ± 1294.93	150 (0 - 5040)	0.606	0.314 – 0.774
Vigorous Activities (MET*min/week)	937.4 ± 1212.35	480 (0 - 4800)	927.65 ± 1068.06	705 (0 - 3840)	0.851	0.741 – 0.915
Total AQuAA-T Score (MET*min/week)	13172.88 ± 9008.99	10706.25 (2715 - 53002.5)	12730.06 ± 6770.2	11922.75 (966.5 - 31989)	0.75	0.565 – 0.857

SD: standart deviation, Med (Min - Max): median (minimum - maximum), MET*min: metabolic equivalent*minute, ICC: intraclass correlation coefficient; C.I: Confidence Interval

Table 3. Spearman's rank-correlation coefficients between the AQuAA-Tr and the IPAQ-SF for adolescents and adults

Adolescent (n=72)					
		IPAQ-SF Walking Activities	**IPAQ-SF Moderate Activities**	**IPAQ-SF Vigorous Activities**	**IPAQ-SF Total Score**
AQuAA-Tr Sedentary Activities	r	0.172	0.250	0.413*	0.304*
	p	0.151	0.182	0.045	0.009
AQuAA-Tr Light Activities	r	0.150	0.024	0.471*	0.172
	p	0.211	0.900	0.020	0.149
AQuAA-Tr Moderate Activities	r	0.060	0.117	0.500*	0.223
	p	0.617	0.537	0.013	0.059
AQuAA-Tr Vigorous Activities	r	-0.036	-0.018	0.660*	0.115
	p	0.763	0.926	0.000	0.337
AQuAA-Tr Total Score	r	0.103	0.036	0.768*	0.219
	p	0.391	0.851	0.000	0.064
Adult (n=52)					

		IPAQ-SF Walking Activities	IPAQ-SF Moderate Activities	IPAQ-SF Vigorous Activities	IPAQ-SF Total Score
AQuAA-Tr Sedentary Activities	r	0.248	-0.084	0.070	0.148
	p	0.082	0.719	0.763	0.294
AQuAA-Tr Light Activities	r	0.525*	-0.306	-0.362	0.315*
	p	0.000	0.178	0.107	0.023
AQuAA-Tr Moderate Activities	r	0.043	0.057	0.019	0.069
	p	0.766	0.807	0.934	0.629
AQuAA-Tr Vigorous Activities	r	0.151	-0.262	0.422*	0.290*
	p	0.297	0.252	0.05	0.037
AQuAA-Tr Total Score	r	0.423*	-0.294	-0.143	0.299*
	p	0.002	0.196	0.536	0.031

r: Spearman's rank correlation coefficient, * significant correlation

Construct Validity Study

For the construct validity study of the AQuAA-Tr, step counts were followed for two weeks in 34 adolescents (26 women and 8 men, with a mean age of 14.7 ± 0.2 years) and 39 young adults (27 women and 12 men, with a mean age of 25.6 ± 1.5 years) with Samsung Health® mobile application. In adolescents, correlations between activity scores of the AQuAA-Tr and step counts measured on Samsung Health® applications were weak or negligible. A moderate (r=0.504) correlation was found between the light activity scores of the AQuAA-Tr and step counts measured on Samsung Health® applications in adults. Other correlations were weak or negligible. Table 4 shows the correlations between the AQuAA-Tr and data from the Samsung Health® application.

Table 4. Spearman's rank-correlation coefficients between the AQuAA-Tr and the Samsung Health® for adolescents and adults

		Adolescent (n=34)	Adult (n=39)
AQuAA-Tr Sedentary Activities	r	-0.002	0.348*
	p	0.990	0.030
AQuAA-Tr Light Activities	r	0.093	0.504*
	p	0.600	0.001
AQuAA-Tr Moderate Activities	r	-0.149	-0.009
	p	0.400	0.955
AQuAA-Tr Vigorous Activities	r	-0.144	0.011
	p	0.417	0.948
AQuAA-Tr Total Score	r	-0.061	0.435*
	p	0.730	0.006

r: Spearman's rank correlation coefficient,
* significant correlation

DISCUSSION

In this study, the test-retest reliability, criterion validity, and construct validity of the AQuAA-Tr, which was created by applying the protocol recommended by AAOS for cross-cultural adaptation studies, were investigated.

As a result of our study, the Turkish version of the AQuAA (AQuAA-Tr), which is a PA questionnaire that allows collecting information about PA from both adolescent and adult age groups, was introduced into our language. However, while the reliability of the AQuAA-Tr was confirmed in both adolescents and adults, its criterion and construct validity was not confirmed in either adolescents or adults. We think that introducing a PA questionnaire, which can provide detailed information about sedentary, light, moderate and vigorous PA separately and total PA and allows the evaluation of PA in different categories, into our language will be useful for clinical and research environments related to PA.

Test-Retest Reliability

In the current study, the test-retest reliability of the AQuAA-Tr ranged from very strong to strong in adolescents and moderate to strong in adults. Chinapaw et al. [9] reported fair to moderate test-retest reliability in their study, in which they administered the AQuAA to healthy adolescent and adult individuals twice, with an interval of two weeks. Liu et al. [12] reported good to excellent test-retest reliability in their study, in which they administered the same questionnaire to cancer patients twice, with an interval of five days. The test-retest reliability findings of the AQuAA-Tr in the current study seem to be consistent with those of previous

studies but slightly higher. The highest reliability findings of the AQuAA-Tr were observed for the scores of vigorous activities in both adolescents and adults. One reason for this may be that people can remember the vigorous activities they did during the last week more easily than sedentary, light, and moderate activities. Another reason may be that people with vigorous activity levels have more regular PA habits than those with sedentary, light, and moderate activity levels, and accordingly, their awareness of PA behaviours is higher.

Criterion Validity

During the development stage of the AQuAA, no criterion validity study was conducted on the grounds that there was no gold standard method for assessing the criterion validity of PA questionnaires [9]. However, no studies on the evaluation of the criterion validity of the AQuAA were found. Therefore, our study is thought to be the first to evaluate the criterion validity of the AQuAA. In the current study, the criterion validity of the AQuAA-Tr was generally weak and negligible in both adolescents and adults although some moderate and strong correlations were found. Therefore, the criterion validity of the AQuAA-Tr could not be verified. There is no consensus in the literature on defining PA intensity and classifying PA levels. While there are researchers [23] who divide PA levels into four categories (sedentary, light, moderate, and vigorous), there are also those [24] who divide them into five categories (very light, light, moderate, vigorous, and very vigorous). While the AQuAA is used to examine PA levels in four categories [9], IPAQ-SF, which we used to evaluate the criterion validity of the AQuAA-Tr in our study, is utilized to examine PA levels in three categories [15]. This situation makes it difficult to compare instruments used to assess PA with each other and may be the reason for the weak and negligible criterion validity between the AQuAA-Tr and the IPAQ-SF. On the other hand, moderate correlations were found between the vigorous activity scores of the AQuAA-Tr and the IPAQ-SF in both adolescents and adults. Therefore, it can be said that there is a correlation between the AQuAA-Tr and the IPAQ-SF in terms of the assessment of vigorous activities in both adolescents and adults. This may be due to the configured and usual nature of vigorous physical activities, which often consist of organized sports. Besides, in the current study, the highest correlations between the AQuAA-Tr and the IPAQ-SF were observed in the vigorous PA scores of IPAQ-SF in adolescents and in walking PA scores of the IPAQ-SF in adults. This suggests that the general tendency of individuals toward weekly physical activities is in favour of vigorous physical activities in adolescents and in favour of walking or light physical activities in adults. Therefore, when preparing PA programs, it will be useful to consider that the intensity preferences for weekly physical activities may differ between age groups (adolescent-adult).

Construct Validity

The construct validity of the AQuAA-Tr in the current study was generally weak and negligible in both adolescents and adults, although some moderate correlations were found in adults. Therefore, the construct validity of the questionnaire could not be verified. Chinapaw et al. [9] reported insignificant construct validity in their study, in which they evaluated the construct validity of the AQuAA in adolescents and adults by using step counts obtained from the ActiGraph accelerometer. Liu et al. [12] reported poor construct validity in their study, in which they evaluated the construct validity of the AQuAA in cancer patients by using the step counts obtained from the ActiGraph accelerometer. Oostdam et al. [11] reported poor construct validity in their study, in which they evaluated the construct validity of the AQuAA in overweight and obese pregnant women by using the step counts obtained from the ActiGraph® accelerometer. In their review, Sallis and Saelens [25] reported that the validity correlations of self-report PA questionnaires ranged from .07 to .88 in children and adolescents and from .14 to .36 in adults. For these reasons, it can be said that the construct validity findings of the AQuAA-Tr in our current study are similar to previous studies in which the construct validity of many PA questionnaires were examined along with the AQuAA. It was considered that the reason for the low correlation between the AQuAA-Tr and the data from the Samsung Health® application was that both age groups participating in the study might have had difficulty remembering the duration and perceived intensity of the physical activities they completed in the last seven days and that the perceived PA levels of the participants and their actual PA levels might have differed. Another reason for these results may be that the AQuAA-Tr and the Samsung Health® application do not focus on exactly the same parameters in terms of PA assessment. Therefore, in our study, while only information about the number of steps was obtained from the Samsung Health® application, the AQuAA-Tr was utilized to obtain information about different areas of PA and different PA intensities.

For future research, we recommend that studies with samples including a wider age range in both adolescents and adults should be conducted to have more insights into the validity of the AQuAA-Tr.

Limitations

This study has several limitations. In the evaluation of the construct validity of the AQuAA-Tr, the number of steps was obtained from the Samsung Health® application not from the ActiGraph® accelerometer, as in the previous studies. Another limitation of our study is that the adults who participated in our study were mostly young adults, and adults from a wider age range could not be included in our study.

CONCLUSIONS

The AQuAA, which is used in many clinical settings and studies related to PA, was adapted to Turkish and its validity and reliability were examined. Introducing a PA questionnaire, which can provide detailed information about sedentary, light, moderate, and vigorous PA scores separately and total PA scores and allows the assessment of PA in different categories, into our language will be useful. In addition, considering that PA questionnaires that can be used to evaluate the PA levels of adolescents and young adults in our language are more limited than those used to assess other age groups, the AQuAA-Tr will contribute to studies conducted to increase the PA levels in children, adolescents, and young adults. However, the results of the AQuAA-Tr should be interpreted carefully in the clinic.

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Conflict of interest: The authors report that they have no conflicts of interest to declare.

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APPENDIX

Turkish Version of Activity Questionnaire for Adults and Adolescents (AQuAA-Tr)
Yetişkinler ve Adölesanlar için Aktivite Anketi (YAAA)

Geçen hafta hakkında düşünün (yedi gün). Lütfen aşağıdaki aktiviteleri bu hafta kaç gün boyunca gerçekleştirdiğinizi, günde ortalama kaç saat yaptığınızı ve (uygulanabilirse) bu aktivitenin sizin için ne kadar yorucu olduğunu belirtiniz.

1. İŞE GİDİŞ-GELİŞ AKTİVİTELERİ			
	Haftalık gün sayısı	**Günde ortalama süre**	**Efor**
1.1. İşe ve okula gidip gelirken yürüme	…gün	…saat, …dakika	yavaş/orta/hızlı
1.2. İşe ve okula gidip gelirken bisiklet kullanma	…gün	…saat, …dakika	yavaş/orta/hızlı
1.3. İşe ve okula gidip gelirken toplu taşıma, araba veya motosiklet kullanma	…gün	…saat, …dakika	
Uygulanamaz	…..		
2. İŞTEKİ VE OKULDAKİ AKTİVİTELER **Öğle tatili sırasında yürüyüş yapmak, bölüm 4: boş zaman aktivitelerine doldurulmalıdır**			
		Haftalık gün sayısı	**Günde ortalama süre**
2.1. Hafif iş Örneğin oturmak/biraz yürüme ile ayakta durmak, örneğin masa başı bir iş, dersleri takip etmek[b], kahve yapmak[a].		…gün	…saat, …dakika
2.2. Orta iş Örneğin düzenli yürüme ile çalışmak (merdivenler), hafif nesneleri taşıyarak yürümek, temizlik, beden eğitimi, gazeteleri dağıtmak[b].		…gün	…saat, …dakika
2.3. Yoğun iş Örneğin ağır bir çanta/okul çantası gibi ağır nesneleri taşıyarak yürüme (merdivenler)[b].		…gün	…saat, …dakika
Uygulanamaz		…..	
3. EV AKTİVİTELERİ (evin içinde ve çevresinde)			
		Haftalık gün sayısı	**Günde ortalama süre**
3.1. Hafif ev işleri Örneğin yemek pişirme, bulaşık yıkama, yatak yapma, evde çocuk bakımı[a]		…gün	…saat, …dakika
3.2. Orta ev işleri Örneğin süpürme, hafif objeler ile yürüme/taşıma, süpürme.		…gün	…saat, …dakika
3.3. Yoğun ev işleri Örneğin ağır alışveriş çantaları ile yürüme		…gün	…saat, …dakika
Uygulanamaz		…..	

4. BOŞ ZAMAN AKTİVİTELERİ **İşe veya okula gidiş-geliş aktiviteleri hariçtir. Aktif sporlar, 6. bölümde doldurulmalıdır.**			
	Haftalık gün sayısı	**Günde ortalama süre**	**Efor**
4.1. Yürüyüş Örneğin süpermarket-e/den, öğle tatilinde yürüyüş, köpek gezdirmek.	…gün	…saat, …dakika	yavaş/orta/hızlı
4.2. Bisiklete binme Örneğin süpermarket-e/den, spor kulübü, sinema.	…gün	…saat, …dakika	yavaş/orta/hızlı
4.3. Bahçe işleri/Ufak tefek işler Örneğin çim biçme (elektrikli olmayan), duvar boyama, marangozluk	…gün	…saat, …dakika	yavaş/orta/hızlı
Uygulanamaz		…..	
5. SEDANTER BOŞ ZAMAN AKTİVİTELERİ			
		Haftalık gün sayısı	**Günde ortalama süre**
5.1. Televizyon izleme		…gün	…saat, …dakika
5.2. Bilgisayar kullanma Örnegin evde internette sörf yapmak, bilgisayar oyunları oynamak		…gün	…saat, …dakika
5.3. Okuma		…gün	…saat, …dakika
5.4. Diğer sedanter aktiviteler Örnegin arkadaşlarla konuşmak, masa oyunları, arabada oturmak		…gün	…saat, …dakika
Uygulanamaz		…..	
6. AKTİF SPOR **Geçen hafta yaptığınız sporları aşağıya yazınız (en fazla 3 spor).** **En aktif spor ile başlayın.** Örneğin tenis, fitness, paten kayma, yüzme ve dans.			
	Haftalık gün sayısı	**Günde ortalama süre**	**Efor**
1.	…gün	…saat, …dakika	yavaş/orta/hızlı
2.	…gün	…saat, …dakika	yavaş/orta/hızlı
3.	…gün	…saat, …dakika	yavaş/orta/hızlı
Uygulanamaz	…..		

[a] yalnızca yetişkinler için örnek
[b] yalnızca adölesanlar için örnek