Validity, Reliability, and Invariance of the Greek Version the Physical Activity Perceived Barriers Scale

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Abstract: The study aimed to examine the validity, reliability, and factorial invariance across gender of the PAPBS (Physical Activity Perceived Barriers Scale) in Greek children. 613 students (322 boys and 291 girls) from a city of Greece completed the above scale in 3 periods during a school year. Confirmatory factor analysis was applied. Strong evidence was found for the hypothesized second-order factor structure of the physical activity perceived barriers scale in the 3 measurements (comparative fit index = 0.951, 0.933, 0.922, and root mean square error of approximation = 0.061, 0.069, 0.074). The scale's internal consistency was supported satisfactorily, whereas correlations coefficients between scale and several physical activity scores were significant moderate to high. Finally, results provided support of the invariance of the first- and second-order factor loadings and invariance structural residuals, but weak support of the invariance of the residual variance of observed variables of the examined scale across gender. The findings suggest that physical activity perceived barriers scale is appropriate for use with Greek children and it is considered as a useful tool for researches interested in studying the children's participation in physical activity.

Key words: Psychometrics, construct validity, health, fitness.

1. Introduction

Children's participation in PA (physical activity) is known to have many physical, psychological, and emotional health benefits during childhood and later in life [1]. Despite the health benefits of regular PA, children do not participate in PA and failing to meet established guideline of 60 minutes or more of moderate-to-vigorous PA daily [2]. This finding reinforces the need for intervention programs to increase children's PA. To guide the development and implementation of such programs, it is important to understand the various biological, social, environmental, and psychological factors that influence activity behavior in children [3, 4]. Among psychological factors, that are the most-researched ones, perceived barriers to PA are an essential component which is significantly correlated with PA maintenance in children [5, 6].

Perceived barriers, which are the individual's opinion of the tangible costs of an action or behavior, are an important factor related to health behavior and the most significant one in determining behavior change [7]. More specifically, the presence of perceived barriers decreases the likelihood of engaging in preventive health practices, especially if they outweigh the perceived benefits of doing so [8]. Consequently, in trying to increase PA, it is obvious that the perceived barriers should be overcome for a new behavior to be adopted.

In relevant studies of children, the most frequently cited barriers to PA were time constraints, schoolwork, lack of interest/desire, tiredness, lack of motivation, emotional symptoms, and unsuitable weather [9-11]. Also, it is reported that perceived barriers correlated negatively with children's PA and sports, and were a major inverse predictor of PA, indicating that students

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who perceive fewer barriers to PA are more likely to participate in PA, than students who perceive more barriers [5, 12]. Therefore, perceived barriers to children's PA should be well understood and be measured validly and reliably in order to contribute successfully to intervention programs seeking to increase children's PA.

Most researchers, however, that have examined the relationship between perceived barriers and PA used scales that have not been adequately validated. Brown et al. [13], in their systematic review, found only six studies that have examined the validity and reliability of perceived barriers to PA construct in children. They reported test-retest reliability coefficients ranging from 0.52 to 0.82 and Cronbach's alpha ranging from 0.55 to 0.85. Furthermore, nearly all research examining perceived barriers utilized measures adapted from other studies or previous populations such as adults. Finally, few studies have established the factorial validity and invariance of the perceived barriers to children's PA scale to ensure that this construct is being measured similarly in different groups of people or at separate time [14, 15].

Wu et al. [16] examined the validity and reliability of a perceived barriers to PA scale with Taiwanese adolescents. The scale had 12 items and included three separate factors (time constraints, environmental surroundings, and personal issues). Cronbach's alpha for these subscales were 0.69, 0.72, and 0.71, respectively. Furthermore, the construct validity of the scale was supported by examining the correlation between adolescent's perceived barriers and duration of PA.

To date, no factorial data, or psychometric properties of the perceived barriers to PA are available in the Greek language, hence prompting the present study. The aim of the present research, therefore, was to: (1) assess the factorial validity; (2) evaluate the factorial invariance across gender; (3) test the internal consistency and (4) further explore the construct validity with regard to the relationship to scores of PA,

of a scale that assesses the perceived barriers to PA among Greek children.

2. Material and Methods

2.1 Participants

Participants were 613 fifth and sixth-grade students (322 boys and 291 girls) of the 5th and 6th grade from 12 primary schools in a Greek city.

2.2 Measures

The perceived barriers to PA were measured by subjects' responses to 12 items of PAPBS (Physical Activity Perceived Barriers Scale) that was used by Wu et al. [16] in relevant study with Taiwanese adolescents, regarding beliefs about barriers that they perceive as preventing them from performing PA (e.g., "I don't exercise because I don't have time", or "I don't exercise because I don't have a good place to exercise" (Table A1)). Participants responded to a 5-point continuum (1 = "strongly disagree" to 5 = "strongly agree"). Wu et al. [16] proposed a second-order factor model with an overall barrier factor having paths to the three subfactors or first-order factors. The first-order factor of PAPBS was "personal issues" that included 5 items, the second first-order factor was "environmental surroundings" having 4 items and finally the third first-order factor "time constraints" included 3 items. They also demonstrated acceptable validity and internal consistency of the scale in two groups of Taiwanese adolescents [16].

The PA was assessed by the SAPAC (Self Administered Physical Activity Checklist) [17] that consists of a list of 21 physical activities which the children used to participate (Table A2). Students reported the minutes they spent in each activity during three time periods of the previous day, before school, during school, and after school. They were instructed to report engaging in an activity only if they did so for 5 min or more "at one time". For every activity, students reported whether it caused them to "breathe

hard or feel tired none, some, or most of the time". This rating provided a subjective index of intensity. The questionnaire was administered to an entire class simultaneously, in three consecutive days. All physical activities in the SAPAC were calculated in terms of: (1) physical activity METs score (MVPA METs) (min of activity X MET value); (2) weighted activity MET score (weighted MVPA METs) (min of activity X MET value X intensity rating) and (3) minutes of moderate to vigorous physical activity (min of MVPA). A recent study in Greece has demonstrated acceptable validity, reliability, and internal consistency of the SAPAC in young children [18].

2.3 Procedures

Students were assessed at the beginning (October), in the middle (February), and at the end (May) of the school year 2009-2010 from one group of trained physical education teachers. They completed PAPBS and SAPAC in groups per class during a two hours period. Students agreed to participate in the study after their parents gave a written informed consent. The anonymity and the protection of the students were ensured. The study had the permission of the Greek Ministry of Education and the school authorities.

2.4 Statistical Analysis

Statistical analyses of data involved: (1) CFA (confirmatory factor analysis); (2) factorial invariance across gender; (3) Cronbach's alpha, inter-item correlation, corrected item-total correlation to test the internal consistency of the examined scale and (4) Pearson's product moment correlation coefficient to further explore the construct validity of the scale. The factorial structure of PAPBS was examined by using CFA with the ML (maximum likelihood) technique. Data were analyzed using the Amos 18.0 statistical software [19].

The hypothesized second-order factor model was specified in the following way: (1) responses to the PAPBS could be explained by three first-order factors ("personal issues", "environmental surroundings", "time constraints"), and one second-order factor ("perceived barriers"); (2) each item would have a non-zero loading on the first-order factor that it was designed to measure, and zero loadings on the other two first-order factors; (3) errors terms associated with each item would be uncorrelated and (4) covariation among the three first-order factors would be explained fully by their regression on the second-order factor [20].

In the present study, model fit was assessed using various absolutes as well as comparative/incremental fit indexes. The chi-square statistic, an absolute fit index, is a classic test that assesses exact fit of the specified model to the data. However, the chi-square is very sensitive to sample size or violations of the multivariate normality assumptions and therefore the fit of the model is often evaluated by means of a group of descriptive and comparative/incremental fit indices [21]. Contrary to the chi-square test, which examines whether the hypothesized model is correct or not, the RMSEA (root mean square error of approximation) [22] is another absolute fit index which estimates how well the fitted model approximates the population covariance matrix per degree of freedom. Browne and Cudeck [23] suggested that RMSEA value smaller than 0.05 are indicative of close fit, and values smaller than 0.08 are still considered reasonable. RMSEA 90% CI is also used to assess hypotheses of close fit (RMSEA < 0.05) and not-close fit (RMSEA > 0.05). Finally, the GFI (goodness of-fit) index is applied with values ranging from 0 (poor fit) to 1.0 (perfect fit).

Comparative/incremental fit indexes compare the fit of the model of interest and alternative nested models. The CFI (comparative fit index) compares the adequacy of the hypothesized model in relation to an independent (null) model which assumes that all variables are uncorrelated. The Bentler and Bonett's [24] NFI (normed fit index) is an alternative to CFI

that estimates the relative improvement per degree of freedom of the hypothesized model over a baseline model. CFI and NFI values approximating 1.0 indicate perfect fit, whereas values below 0.90 indicate a need to respecify the model.

Factorial invariance of PAPBS, with respect to gender, was examined using multiple group analysis. To compare the alternative models, the χ^2 difference test ($\Delta\chi^2$) and ΔCFI were used. Marsh [25] discussed that the tests of statistical significance of change in $\Delta\chi^2$ are suffering from same problems as the tests of statistical significance in regular confirmatory analysis. Marsh argued the use of other descriptive model fit indexes such as GFI, CFI, and RMSEA in testing the hypothesis of group invariance. Furthermore, Cheung and Rensvold [26] suggested that change in CFI values across the testing in each step of the sequential multi-group invariance analysis is warranted. More specifically, they have proposed a criterion of -0.01 in CFI between more and less restrictive invariance models for the rejection of the null hypothesis in testing the multi-group factorial invariance. A number of researchers have used this criterion in evaluating the multi-group factorial invariance in CFA models [27, 28].

To test the internal consistency of the scale, the following indexes are estimated: (1) inter-item correlations; (2) item-total correlations and (3) Cronbach's alpha coefficient. For an acceptable internal consistency, the Cronbach's alpha should exceed 0.70 [29].

Finally, construct validity, that is the extent to which a test measures the intended construct, was examined by estimating the bivariate correlations between the PAPBS and PA (total METs, weights METs, min of MVPA) values.

3. Results

The summary statistics for the CFA are presented in Table 1. As shown, all the standardized item loadings were statistically significant at the 0.05 level, ranging from 0.52 to 0.85 in all three measurements, being absolutely satisfactory (> 0.40). Also, the squared multiple correlations (R^2), that provide a direct index of performance of each factor, revealed strong evidence for the factorial validity of the hypothesized model. The R^2 values ranged from 0 to 1, with large R^2, represent the proportion of variance explained in each item by its corresponding factor. As shown in Table 1, all R^2 values were satisfactory indicating that all items were loaded on their designated factors, in all three measurements.

The analysis of the goodness-of-fit indexes of the propose second-order model showed that: (1) all GFI, NFI, and CFI indexes were acceptable (> 0.900) and (2) the RMSEA indexes ranged from 0.061 to 0.074, indicating acceptable fit of the proposed model to the data in all three assessments. More specifically, the chi-square statistic values were $\chi^2_{(df)} = 166.017_{(51)}$, $P = 0.000$, $\chi^2_{(df)} = 201.180_{(51)}$, $P = 0.000$ and $\chi^2_{(df)} = 219.640_{(51)}$, $P = 0.000$, in the three measurements, respectively. Also, the fit indexes were GFI = 0.956, NFI = 0.931, CFI = 0.951 in the first measurement, GFI = 0.947, NFI = 0.913, CFI = 0.933 in the second measurement and GFI = 0.943, NFI = 0.901, CFI = 0.922 in the third measurement. Finally, the RMSEA (90% CI) indexes were 0.061 (0.051-0.071), 0.069 (0.059-0.080) and 0.074 (0.064-0.084) in the three measurements, respectively.

Furthermore, the 12-item hierarchical model of the PAPBS was tested for invariance across gender in all three measurements. The model was initially tested for each group (boys, girls) separately. This allowed the adequacy of the model to be assessed within each group prior to the multi-group invariance analysis. According to the results, the hypothesized model in group of boys was a good representation of the data, since the model's fit indexes were acceptable. However, results indicated that the proposed model for girls wasn't fully supported by all fit indexes (see Table 2).

Table 2 also contains the fit indexes for each step of

Table 1 Results of confirmatory factor analyses ($N = 613$).

| | Physical Activity Perceived Barriers Scale | | | | | | | | |
| | 1st measurement | | | 2nd measurement | | | 3rd measurement | | |
Items	SRW	V	R^2	SRW	V	R^2	SRW	V	R^2
	Personal issues								
8	0.54	0.70	0.30	0.57	0.65	0.33	0.59	0.57	0.35
9	0.59	0.42	0.35	0.56	0.39	0.32	0.58	0.37	0.34
10	0.62	0.54	0.38	0.65	0.52	0.42	0.64	0.46	0.41
11	0.55	0.57	0.30	0.56	0.51	0.31	0.52	0.51	0.27
12	0.61	0.53	0.37	0.60	0.48	0.36	0.61	0.45	0.37
	Environmental surroundings								
3	0.69	0.50	0.47	0.67	0.50	0.45	0.66	0.45	0.44
4	0.68	0.39	0.46	0.66	0.36	0.44	0.62	0.33	0.39
5	0.61	0.50	0.37	0.59	0.45	0.35	0.58	0.44	0.34
6	0.66	0.55	0.44	0.65	0.52	0.43	0.63	0.51	0.40
	Time constraints								
1	0.85	0.27	0.72	0.84	0.29	0.71	0.79	0.35	0.62
2	0.78	0.33	0.62	0.71	0.42	0.50	0.73	0.35	0.53
7	0.74	0.41	0.55	0.75	0.39	0.57	0.74	0.33	0.54

SRW = standardized regression weights, V = variances, R^2 = squared multiple correlations.

Table 2 Summary of fit statistics for testing measurement invariance across gender ($N = 613$).

Model	χ^2	df	RMSEA (90% CI)	GFI	CFI	$\Delta\chi^2$	Δdf	p	ΔCFI
			1st measurement						
Gender									
Boys	110.258	51	0.060 (0.045-0.076)	0.949	0.963				
Girls	137.477	51	0.076 (0.061-0.092)	0.924	0.891				
1st	247.742	102	0.048 (0.041-0.056)	0.937	0.939				
2nd	264.545	111	0.048 (0.040-0.055)	0.933	0.936	16.803	9	0.052	0.003
3rd	281.553	114	0.049 (0.042-0.056)	0.929	0.930	17.008	3	0.001	0.006
4th	281.807	117	0.048 (0.041-0.055)	0.929	0.931	0.255	3	0.968	-0.001
5th	330.056	129	0.051 (0.044-0.057)	0.914	0.916	48.249	12	0.000	0.015
			2nd measurement						
Gender									
Boys	159.978	51	0.082 (0.067-0.096)	0.924	0.906				
Girls	136.505	51	0.076 (0.061-0.092)	0.926	0.861				
1st	296.482	102	0.056 (0.049-0.063)	0.925	0.891				
2nd	305.044	111	0.053 (0.046-0.061)	0.923	0.900	8.561	9	0.479	0.000
3rd	319.267	114	0.054 (0.047-0.061)	0.920	0.897	14.224	3	0.003	0.005
4th	322.173	117	0.054 (0.047-0.061)	0.918	0.900	2.905	3	0.406	0.000
5th	378.162	129	0.056 (0.050-0.063)	0.906	0.889	55.989	12	0.000	0.019
			3rd measurement						
Gender									
Boys	126.721	51	0.068 (0.053-0.083)	0.940	0.929				
Girls	159.244	51	0.086 (0.071-0.101)	0.915	0.822				
1st	285.973	102	0.054 (0.047-0.062)	0.928	0.890				
2nd	295.138	111	0.052 (0.047-0.059)	0.927	0.899	9.165	9	0.422	0.000
3rd	310.481	114	0.053 (0.046-0.060)	0.924	0.895	15.343	3	0.002	0.006
4th	312.802	117	0.052 (0.045-0.059)	0.923	0.898	2.321	3	0.508	0.000
5th	347.596	129	0.053 (0.046-0.059)	0.911	0.897	34.794	12	0.001	0.010

$RMSEA$ = root mean square error of approximation; GFI = goodness of fit index; CFI = comparative fit index.

the invariance analysis of the proposed model across the three measurement occasions. In model comparisons, we mainly judged model improvement on the CFI change since it is independent of both model complexity and sample size. Five comparisons in goodness-of-fit for "1st Model " through "5th Model" were performed. The first hypothesis tested was that the three-factor structure was invariant among boys and girls ("1st Model"). This model is defined to be the minimal criterion for testing factor invariance. Results of the analysis showed that the model with no constraints ("1st Model") represents a reasonable fit to the data, in all three measurements. The second hypothesis tested was a more restrictive model ("2nd Model"), specifying equal first-order factor loading among boys and girls. The specific model fitted the data well since there was no substantial difference in CFI in all three measurements (ΔCFI = 0.003, ΔCFI = 0.000, and ΔCFI = 0.000). Similarly, results of the third hypothesis ("3rd Model") indicated that the second-order factor loadings were invariant across gender (ΔCFI = 0.006, ΔCFI = 0.005, and ΔCFI = 0.006). Subsequently, there was no appreciable difference in the structural residuals ("4th

Model") between boys and girls in three measurements (ΔCFI = -0.001, ΔCFI = 0.000, and ΔCFI = 0.000). However, results of the fifth hypothesis of invariance of residual variance of observed variables ("5th Model"), revealed that there was a significant change in fit in all three assessment times (ΔCFI = 0.015, ΔCFI = 0.019, and ΔCFI = 0.010) across gender.

Reliability analyses indicated that the three factors of PAPBS were internally consistent. Specifically, the inter-item correlations as well as the item-total correlations were internally consistent (see Table 3). Furthermore, the Cronbach's alpha coefficients for all subscales were acceptable (see Table 3).

Finally, Pearson product moment correlations coefficients among the PAPBS subscale values and the total METs, weighted METs, and time of PA were significant moderate to high (> 0.40), ranging from -0.42 to -0.71, in the three measurements. The higher correlations were found between mean scores of subscale "personal issues" and PA (ranged from -0.55 to -0.62), whereas the lower ones were found between "time constraints" and PA (ranged from -0.46 to -0.53). Therefore, the above results support the construct

Table 3   Internal consistency indices (mean, minimum value, maximum value) of the Physical Activity Perceived Barriers Scale (N = 613).

Variables	Item means (Min*-Max*)	Inter-item correlations (Min*-Max*)	Item-total correlations (Min*-Max*)	alpha Cronbach
1st measurement				
Personal issues	1.97 (1.56-2.30)	0.33 (0.20-0.45)	0.47 (0.36-0.55)	0.71
Environmental surroundings	1.91 (1.70-2.07)	0.43 (0.40-0.48)	0.55 (0.51-0.57)	0.75
Time constraints	2.80 (2.62-3.04)	0.63 (0.56-0.67)	0.70 (0.66-0.74)	0.83
Total scale	2.16 (1.56-3.04)	0.33 (0.19-0.67)	0.53 (0.30-0.57)	0.86
2nd measurement				
Personal issues	1.94 (1.54-2.29)	0.34 (0.20-0.48)	0.48 (0.39-0.55)	0.72
Environmental surroundings	1.88 (1.67-2.03)	0.41 (0.35-0.46)	0.53 (0.49-0.56)	0.74
Time constraints	2.77 (2.56-3.02)	0.59 (0.51-0.64)	0.66 (0.62-0.72)	0.81
Total scale	2.13 (1.54-3.02)	0.33 (0.20-0.64)	0.53 (0.46-0.59)	0.86
3rd measurement				
Personal issues	1.89 (1.49-2.25)	0.34 (0.20-0.49)	0.48 (0.39-0.56)	0.72
Environmental surroundings	1.80 (.58-1.94)	0.39 (0.34-0.46)	0.51 (0.48-0.52)	0.72
Time constraints	2.69 (2.46-2.94)	0.56 (0.52-0.59)	0.64 (0.62-0.67)	0.79
Total scale	2.06 (1.49-2.94)	0.33 (0.20-0.59)	0.52 (0.48-0.56)	0.85

*Min = minimum; Max = maximum.

validity of the examined scale.

4. Discussion

Previous research suggests that perceived barriers are an important variable for predicting PA levels in children and adults. However, measurement properties of an instrument to assess the perceived barriers for PA construct have not been adequately established. In addition, each one of the dimensions that comprise this construct has not been fully identified. Therefore, the main purpose of the present work was to examine (1) factorial validity and factorial invariance across gender; (2) reliability and (3) construct validity of the PAPBS for children in the Greek-speaking population during a school year.

Regarding the analysis of the results obtained, we demonstrated that the hypothesized second-order factor model of perceived barriers for PA produced an acceptable fit for the Greek sample. More specifically, consistent with prior literature [16], we concluded that the hierarchical model in which the three factors are loading on the second-order factor fitted well the data in all three assessment times. Furthermore, the fit of the hypothesized model was at least as good, if not superior, to the results obtained with the original version of this construct. According to the results, the factor "personal issues" obtained the highest value, whereas the factor "time constraints" obtained the lowest value in all three measurements. These results are not in accordance with those obtained in similar studies [9, 16]. Possible explanations could be related to the differences in participants' age, social differences, and not understanding correctly all the scale's items.

The present results provided support of the invariance of the first- and second-order factor loadings and invariance structural residuals, but weak support of the invariance of the residual variance of observed variables of the PAPBS among boys and girls. It is known that particular interest in second-order model is the test of invariance of structural residuals because it ensures that the unique variance of each first-order factor that is not shared by the common second order factor is the same. However, this level of invariance is more advanced and restrictive and it is usually difficult to achieve [30].

With regard to the reliability of the scale, examination of the Cronbach's alpha coefficient showed that scores on the PAPBS subscales were acceptable (> 0.70). In addition, the homogeneity of the PAPBS was confirmed by the inter-item correlation coefficients and the corrected inter-total correlations of the items in all three assessments, which are within the range recommended by many researchers [29].

Finally, the results of this study support the construct validity of the translated version of the PAPBS. The hypothesis that the perceived barriers for PA scales would be negatively related to reported PA scores (total METs, weighted METs, time of PA) was fully confirmed by the data. All correlations were above the proposed value of 0.40 [31]. As it was expected, children who reported more perceived barriers to PA participated less in moderate-to-vigorous PA. Overall, the present study confirmed the negative correlations found in previous studies [5, 11, 12], demonstrating that the scores of the PAPBS are valid.

The validity and reliability data of this study indicate that the perceived barriers to PA scale is a promising instrument that should be further investigated. However, there are several important limitations that may restrict the broader application of this study. Firstly, the study sample was selected from only one Greek city. Consequently, caution must be used when generalizing these findings to children from other Greek cities. Secondly, replication of this investigation with different populations, such as adolescents, overweight/obese or populations from other countries could strengthen conclusions regarding the validity and reliability of the examined scale. Finally, examination of the factorial invariance

between other groups, such as children and adolescents, overweight/obese children and normal-weight children, active children and inactive children or children from high socioeconomic status and children from low socioeconomic status could support the generalisability and construct validity of the proposed scale. Despite these limitations, the examination of the psychometrics properties of PAPBS in the three measurements support the validity and reliability of the examined scale.

5. Conclusion

In short, the results of the present study provide support for the validity and factorial invariance across boys and girls, as well as internal consistency of PAPBS in Greek children. The scale is considered as a useful tool for research examining social-cognitive models related to PA and implementing intervention programs to increase PA levels in the Greek young population.

Acknowledgments

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Appendix A

Table A1   Items of the Physical Activity Perceived Barriers Scale.

1	I don't have time.
2	I have too many chores to do.
3	I don't have a good place to exercise.
4	I don't have right/clothes to exercise.
5	I don't know how to do a certain type of exercise.
6	I don't have right equipment to exercise.
7	I have too much homework to do.
8	I don't have anyone to exercise with.
9	I don't like to exercise.
10	I had PE class earlier today.
11	I am too tired.
12	There are other interesting things to do.

Table A2   Self-Administered Physical Activity Checklist (SAPAC).

PHYSICAL ACTIVITIES	Before School		During School		After School	
	Minutes	Intensity (N S M)	Minutes	Intensity (N S M)	Minutes	Intensity (N S M)
1. Gymnastics						
2. Rhythmic gymnastics						
3. Exercises (push ups, sit ups)						
4. Aerobic dance						
5. Dance (ballet, modern, city dance)						
6. Jump rope						
7. Martial arts (karate, tae kwan do, kick boxing, judo)						
8. Swimming						
9. Cycling						
10. Football						
11. Volleyball						
12. Basketball						
13. Handball						
14. Tennis						
15. Water polo						
16. Table tennis						
17. Sailing						
18. Kayaking						
19. Walking						
20. Running						
21. Mixed Walking/Running						
Other:						
22.						
23.						
24.						

Questionnaire number…......

Date…………………………………

Remember all the physical activities that you participated in the previous day. Write the number of minutes you were doing for each of the activities you did for more than 5 min. Did it make you breathe hard or feel tired? If you did not feel tired or breathe hard during the participation in physical activity, write the letter **N (none)**. If you felt tired or breathed hard some of the time, write **S (some)**. Finally, if you felt tired and breathed hard most of the time, write **M (most of the time)**.