
ORIGINAL

RELIABILITY OF THE SPANISH VERSION OF THE PHYSICAL ACTIVITY QUESTIONNAIRE PAQ-C

FIABILIDAD DE LA VERSIÓN ESPAÑOLA DEL CUESTIONARIO DE ACTIVIDAD FÍSICA PAQ-C

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ABSTRACT

Objective. This research aimed to assess the reliability of the Physical Activity Questionnaire in Spanish children (PAQ-C).
Method. The recognised Spanish translation version of the Physical Activity Questionnaire for Adolescents (PAQ-A) was used as reference. In a sample of 72 children aged between 8 and 14 years, the test-retest reliability of the PAQ-C
was analysed in three measurements: before the Physical Education class (M1), two hours later (M2) and one week later (M3). The reliability was determined by means of the Intraclass Correlation Coefficient (ICC) and the inner consistency through Cronbach’s α coefficient.

**Results.** The results obtained in the overall score of the questionnaire reflect an intraclass coefficient (ICC) higher than 0.73 in every possible comparison giving a confidence interval of 95% which still indicates a good or very good reliability. The inner consistency showed a coefficient of $\alpha = 0.83$.

**KEY WORDS:** Questionnaire, Physical Activity, Reliability, Older children, Adolescents.

**INTRODUCTION**

Physical activity is a prerequisite for an adequate growth and development in children. Various authors describe in their studies the impact of exercise on the prevention of chronic diseases and its connection with overweight and obesity found in children. The latter is a great concern for the public health prevention policies in different countries.

In Spain, the research into the prevalence of child obesity, ALADINO, reveals that overweight remained stable over the last ten years affecting 45.2% of the
boys and girls aged between 6 and 9 years. These findings led to the foundation of the strategy for health, nutrition, physical activity and the prevention of obesity (NAOS) in order to promote regular physical exercise in Spain, especially in school children.

The first step for the implementation of these strategies is to make a diagnosis that will allow us to identify the physical activity trends (mild, moderate, intense) in this population. As a consequence, there are different ways to measure physical activity such as the Doubly Labelled Water method, direct observation or indirect calorimetry, motion monitors and heart rate, all of which are complex and difficult to use for the assessment of large populations. Questionnaires are another viable and easy-to-use alternative for the assessment of physical activity in studies on a larger scale. Therefore, their elaboration, translation and validation in the Spanish population is required.

Nowadays the physical activity questionnaire for adolescents (PAQ-A), translated and validated in Spanish, is available. This is a simple questionnaire that assesses physical activity done by adolescents over the last 7 days. It is part of a family of very similar questionnaires that assess physical activity in three age groups, International Physical Activity Questionnaire (IPAQ).

The Physical Activity Questionnaire for Children (PAQ-C) is the specific questionnaire for children aged between 8 and 14 years, which is highly comparable with the IPAQ-A. They are broadly identical instruments except for the omission in the IPAQ-A of the question about physical activity related to the school break.

The IPAQ-C is a self-administered questionnaire designed to measure moderate to intense physical activity done by children and adolescents over the last 7 days. It consists of ten items, nine of which are used to measure the level of physical activity whereas the other item evaluate whether any disease or another incident prevented the child from doing their regular activities in the last week. The overall result of the test is a score from 1 to 5 with higher scores indicating a greater level of activity.

The original version of the IPAQ-C showed a great inner consistency, test-retest reliability and also proved its correlation with other instruments that measure physical activity such as athletic competence, teachers’ rating of physical activity, fitness assessed via a step test and physical activity assessed with an accelerometer.

This research paper aims to assess the reliability of the PAQ-C questionnaire in Spanish children using the Spanish translation of the PAQ-A questionnaire as reference, which already proved to be valid reliable for adolescents.
METHODS AND MATERIALS

This is a reliability test of the Spanish version of the PAQ-C questionnaire. For the Spanish, transcultural adaptation and translation, the translation and validation by Martínez Gomez, David et al. in 2009 of the PAQ-A questionnaire in Spanish adolescents was used. The instrument, which we were allowed to use, is similar to PAQ-C except for the omission of the question related to the activity done during break time, which in this case will be included. The validation process of that questionnaire was not performed because the original version as well as the PAQ-A Spanish translation in the other age group were already checked. It is therefore not necessary.

Participants

Children aged between 8 and 14 years were selected from the Centre d’Estudis Mollet in Barcelona. 5 class levels were invited: from 5th primary garde to 3rd secondary grade. Prior to the distribution of the questionnaires, informed consents of parents/legal representatives for the children participation in this study were obtained in compliance with the principles contained in the Declaration of Helsinki for scientific research with human subjects.

The sample consisted of 72 subjects including 38 boys and 34 girls aged approximately between 11,6 ± 1,4 years on average. The children with reading and/or comprehension issues as well as those who were ill at the time of the administration of the questionnaire were discarded.

The estimation of the sample was achieved according to GY Zou’s published models with an established statistical power of 80%, a significance level of 5%. Similarly, a minimum ICC of 0.7 and an expected ICC of 0.8 were set. The n was corrected considering predicted losses of 10% and the total size of the population. According to the census produced by the Spanish national institute of statistics (INE), the Spanish child population aged between 8 and 14 years reached 3,181,524 individuals as of 1 January 2013. Therefore, the obtained necessary sample size was n=60 individuals.

Procedure

The questionnaire was administered three times (See Appendix 1)

1) The first measure (M1) was performed at the beginning of the Physical Education class preceded by an explanation of each item that was included in the questionnaire. The children were reassured that it was not a school test.

2) The second measure (M2) was performed at the end of the Physical Education class (2 hours after the first questionnaire). Neither was this measure
performed in the original validation nor in the different PAQ-A validations in adolescents. That was taken into account for the current study since it will allow us to assess physical activity performed during the same week of reference.

3) The third measure (M3) was performed a week later following the same procedure used in the original version. The content and self-administration of the PAQ-C questionnaire was the same.

Statistical analysis

The descriptive statistics of the study are shown as average ± standard deviation, of the sociodemographic characteristics of the individuals and of each item. The response frequency of each category of the items is given. In order to assess the reliability of the questionnaires, the inner consistency was determined using Cronbach's α coefficient. As regards the Test-Retest reliability, where the intra-observer concordance was assessed, the Intraclass Correlation Coefficient (ICC) and its confidence interval at 95% (CI 95%) were used. These were illustrated with Bland and Altman’s graphs (Fig. 2). The reliability criteria described by Fleiss in 2004 that were taken as reference established the following interpretations:
- If ICC > 0.8 reliability is considered excellent.
- If 0.6 < ICC ≤ 0.8 reliability is considered good.
- If 0.4 < ICC ≤ 0.6 reliability is considered moderate.
- If ICC ≤ 0.4 reliability is considered weak or poor.

In addition, the t-student test was used to compare and find whether there were significant statistical differences between the boys and girls regarding the overall score of the questionnaire (Table 3). All the calculations were performed using the SPSS v.21 program for Windows.

RESULTS

It was found in the analysed population that the most repeated activity (7 times or more) from those listed in Table 1 and described in the first question of the questionnaire was walking as an exercise (33.8%) while the least repeated was skiing (96.8%).
Likewise, 31.5% of the children performed a different type of physical activity from those mentioned in the list.

35.6% of the children pointed out that they did physical activity more regularly on Saturdays and 28.2% of them confirmed that they were more active in the evenings (18-22hr), which was the same time when they were at home.

It is worth stressing out that the highest frequency of answers, 32.9%, to question 8 about physical activity performed in the last week was around 3-4 times.

As regards the reliability index, the three Test-Retest estimations were taken into account. Therefore, the ICC was calculated between M1-M2, M1-M3 and M2-M3. All the reliability indexes between M1-M2 were values over 0.8 with all confidence intervals found within 0.7 – 0.9, which still indicates a rather good ICC. We noticed that the CI 95% have a small magnitude (Table 2) (Fig. 2), which signals a good precision and a high reliability of the translated questionnaire.
Table 2. Intraclass Correlation Coefficient and the overall result of the PAQ-C

<table>
<thead>
<tr>
<th>Measure</th>
<th>Measure 1 and 2</th>
<th>Measure 1 and 3</th>
<th>Measure 2 and 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ICC IC 95%</td>
<td>ICC IC 95%</td>
<td>ICC IC 95%</td>
</tr>
<tr>
<td>1 question: list of activities</td>
<td>0.863 0.790 - 0.912</td>
<td>0.747 0.624 - 0.834</td>
<td>0.800 0.699 - 0.876</td>
</tr>
<tr>
<td>2 question: physical education</td>
<td>0.922 0.875 - 0.951</td>
<td>0.735 0.576 - 0.834</td>
<td>0.764 0.623 - 0.862</td>
</tr>
<tr>
<td>3 question: break</td>
<td>0.917 0.868 - 0.948</td>
<td>0.814 0.703 - 0.884</td>
<td>0.809 0.695 - 0.880</td>
</tr>
<tr>
<td>4 question: lunch</td>
<td>0.836 0.737 - 0.897</td>
<td>0.794 0.671 - 0.871</td>
<td>0.844 0.751 - 0.902</td>
</tr>
<tr>
<td>5 question: afternoons (14-18h)</td>
<td>0.885 0.816 - 0.928</td>
<td>0.797 0.676 - 0.873</td>
<td>0.840 0.744 - 0.900</td>
</tr>
<tr>
<td>6 question: evenings (18-22h)</td>
<td>0.910 0.856 - 0.944</td>
<td>0.737 0.580 - 0.836</td>
<td>0.705 0.529 - 0.815</td>
</tr>
<tr>
<td>7 question: weekend</td>
<td>0.852 0.764 - 0.907</td>
<td>0.729 0.566 - 0.830</td>
<td>0.681 0.490 - 0.800</td>
</tr>
<tr>
<td>8 question: weekly intensity</td>
<td>0.933 0.894 - 0.958</td>
<td>0.874 0.799 - 0.921</td>
<td>0.863 0.782 - 0.915</td>
</tr>
<tr>
<td>2 question: physical education</td>
<td>0.905 0.852 - 0.939</td>
<td>0.800 0.698 - 0.870</td>
<td>0.796 0.693 - 0.867</td>
</tr>
<tr>
<td>PAQ-C score</td>
<td>0.848 0.757 - 0.905</td>
<td>0.802 0.684 - 0.876</td>
<td>0.721 0.554 - 0.825</td>
</tr>
</tbody>
</table>

ICC: Intraclass Correlation Coefficient; CI 95%: Confidence Interval at 95% of the ICC
The question about physical activity practised at the weekend revealed a lower test-retest reliability (ICC = 0.681) in the measures M2 and M3 with a magnitude of 0.490 – 0.800.

The overall average score in the three measures was 2.2 with standard deviations of 0.5 (table 3). In relation to the overall score by gender, no significant differences were found in any measures (table 3) between boys and girls. The reliability obtained for this score is relatively good with values of 0.8 between M1-M2 and M1-M3, and slightly lower between M2-M3 as shown in table 2 and in Bland and Altman’s graphs in fig. 2.

The internal consistency of the questionnaire proved to be good with a value of Cronbach’s alpha of 0.83.

**Table 3.** Median and deviation of the PAQ-C overall score by gender

<table>
<thead>
<tr>
<th>PAQ-C overall score</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>2.39±0.50</td>
<td>2.15±0.56</td>
<td>2.28±0.54</td>
<td>0.650</td>
</tr>
<tr>
<td>M2</td>
<td>2.34±0.48</td>
<td>2.00±0.49</td>
<td>2.18±0.51</td>
<td>0.060</td>
</tr>
<tr>
<td>M3</td>
<td>2.29±0.46</td>
<td>2.12±0.54</td>
<td>2.21±0.50</td>
<td>0.179</td>
</tr>
</tbody>
</table>

* T-student test

PAQ-C: Physical Activity Questionnaire for Children, M1: measure 1, M2: measure 2, M3: measure 3
DISCUSSION

The Spanish translation version of the PAQ-C questionnaire for the assessment of physical activity in Spanish children aged between 8 and 14 years show a good test-retest reliability in the overall score with similar values in different measures. The highest score for the test-retest that was performed in the first measure two hours later was ICC=0.848. The original study assessed the reliability of this questionnaire and found a test-retest reliability with a week interval between applications of ICC=0.75 for the boys and 0.82 for the girls. These results are slightly lower than those obtained in our study. The performance of a new measure was considered at the beginning of this research within two hours following the first questionnaire since the performance of a measure with a week between applications could result in the low results obtained in the original version due to the fact that different weeks, when some of the conditions may probably have changed, could be analysed. This may be noticed in the low reliability values found in the question linked to physical activity at the weekend, which indicate that children reveal a higher frequency in the physical activity done on weekdays during the school period and that the variability occurs at the weekends. In relation to former and the increase of the level of physical activity in children, an analysis to determine whether planned activities during the week are better should be carried out because they would certainly guarantee their adherence.

The PAQ-A Spanish validation in adolescents aged between 12 and 17, Martinez et al.\textsuperscript{11} found test-retest reliability values lower than those from our study (ICC=0.71) and those obtained in the original PAQ-C study. The internal consistency value obtained α=0.83 was slightly higher than that found in the original study α=0.79 and the one performed by More J.\textsuperscript{19} α=0.74 and 0.64 who assessed the questionnaire through different races.

On the other hand, no significant differences were found for boys and girls in the overall score of the test. Crocker et al.\textsuperscript{14} mentioned that their study revealed significant differences by gender: boy were considerably more active than girls, however this type of questionnaires was designed to assess physical activity regardless of gender difference.

Finally, the PAQ-C as an instrument that revealed a moderate relationship with another type of instruments and questionnaires used for measuring physical activity Moore JB et al.\textsuperscript{19} found in its study a good correlation between the PAQ-C and Cardiovascular Fitness (CVF) and Athletic competence. Kowalski KC et al.\textsuperscript{13} mentioned a moderated relationship with other instruments such as activity rating, teacher’s rating of physical activity, Athletic competence, the Leisure Time Exercise Questionnaire, caltrac motion sensor, a 7-day physical activity
recall interview and step test of fitness. Therefore, the PAQ-C is an instrument that can be safely used to assess physical activity in children aged between 8 and 14 years over periods in which it is regular such as the school year taking into account some limitations. For example, it does not allow to calculate the estimated consumption of calories and it does not discriminate intense from moderate activity.

CONCLUSION

The Physical Activity Questionnaire PAQ-C provides a good reliability for the assessment of physical activity in Spanish children aged between 8 and 14 years.

REFERENCES


Número de citas totales / Total references: 19 (100%)
Número de citas propias de la revista / Journal's own references: 0 (0%)
ANEXO 1

Cuestionario de actividad física para niños (PAQ-C)

Nombre:  
Sexo: M:-----F:-----  
Profesor:  
Edad:  
Grado:  

Queremos conocer cuál es tu nivel de actividad física en los últimos 7 días (última semana). Esto incluye todas aquellas actividades como deportes, gimnasia o danza que hacen sudar o sentirte cansado, o juegos que hagan que se acelere tu respiración como jugar al pilla-pilla, saltar a la comba, correr, trepar y otras.

Recuerda:
1. No hay preguntas buenas o malas. Esto NO es un examen
2. Contesta las preguntas de la forma más honesta y sincera posible. Esto es muy importante
3. Actividad Física en tu tiempo libre: ¿Has hecho alguna de estas actividades en los últimos 7 días (última semana)? Si tu respuesta es sí: ¿Cuántas veces las has hecho? (Marca un solo círculo por actividad)

<table>
<thead>
<tr>
<th>NO</th>
<th>1-2</th>
<th>3-4</th>
<th>5-6</th>
<th>7 VECES O MÁS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saltar a la comba</td>
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<tr>
<td>Patinar</td>
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<tr>
<td>Jugar a juegos como el pilla-pilla</td>
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<tr>
<td>Montar en bicicleta</td>
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<tr>
<td>Caminar (como ejercicio)</td>
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<td>Correr/footing</td>
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<tr>
<td>Aeróbic/spinning</td>
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<tr>
<td>Natación</td>
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<tr>
<td>Barlar/danza</td>
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<td>Bádminton</td>
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<tr>
<td>Rugby</td>
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<td>Montar en monopatín</td>
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<td>Fútbol/ fútbol sala</td>
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<td>Voleibol</td>
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<td>Hockey</td>
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<td>Baloncesto</td>
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<tr>
<td>Esquiar</td>
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<tr>
<td>Otros deportes de raqueta</td>
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<tr>
<td>Atletismo</td>
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<tr>
<td>Musculación/pesas</td>
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<tr>
<td>Artes marciales (judo, kárate, ...)</td>
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<td>Otros</td>
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<td>Otros</td>
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</tbody>
</table>
2. En los últimos 7 días, durante las clases de educación física, ¿cuántas veces estuviste muy activo durante las clases: jugando intensamente, corriendo, saltando, haciendo lanzamientos? (Señala sólo una)

No hice/hago educación física
Casi nunca
Algunas veces
A menudo
Siempre

3. En los últimos 7 días ¿qué hiciste en el tiempo de descanso? (Señala sólo una)
Estar sentado (hablar, leer, trabajo de clase)....
Estar o pasear por los alrededores,
Correr o jugar un poco
Correr y jugar bastante
Correr y jugar intensamente todo el tiempo

4. En los últimos 7 días, que hiciste hasta la comida(a demás de comer) (Señala sólo una)
Estar sentado (hablar, leer, trabajo de clase)....
Estar o pasear por los alrededores,
Correr o jugar un poco
Correr y jugar bastante
Correr y jugar intensamente todo el tiempo

5. En los últimos 7 días, cuantas días después del colegio hiciste deportes, baile o jugaste a juegos en los que estuvieras muy activo? (Señala sólo una)

Ninguno
1 vez en la última semana
2-3 veces en la última semana
4 veces en la última semana
5 veces o más en la última semana

6. en los últimos 7 días, cuantas tardes hiciste deporte, baile o jugar a juegos en los que estuviste muy activo? (Señala sólo una)

Ninguno
1 vez en la última semana
2-3 veces en la última semana
4-5 veces en la última semana
6-7 veces en la última semana

7. El último fin de semana, ¿cuántas veces hiciste deportes, baile o jugar a juegos en los que estuviste muy activo? (Señala sólo una)
Ninguno.................................................................
1 vez..................................................
2-3 veces......................................
4-5 veces.................................
6 o más veces......................

8. ¿Cuál de las siguientes frases describen mejor tu última semana? Lee las cinco antes de decidir cuál te describe mejor. (Señala sólo una)

Todo o la mayoría de mi tiempo libre lo dediqué a actividades que suponen poco esfuerzo físico.................................................................

Algunas veces (1 o 2 veces la última semana) hice actividades físicas en mi tiempo libre (por ejemplo, hacer deportes, correr, nadar, montar en bicicleta, hacer aeróbic)........................................................................

A menudo (3-4 veces en la última semana) hice actividad física en mi tiempo libre........................................................................

Bastante a menudo (5-6 veces en la última semana) hice actividad física en mi tiempo libre........................................................................

Muy a menudo (7 o más veces en la última semana) hice actividad física en mi tiempo libre........................................................................

9. Señala con qué frecuencia hiciste actividad física para cada día de la última semana (como hacer deporte, jugar, bailar o cualquier otra actividad física)

<table>
<thead>
<tr>
<th></th>
<th>Ninguna</th>
<th>Poca</th>
<th>Normal</th>
<th>Bastante</th>
<th>Mucha</th>
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</thead>
<tbody>
<tr>
<td>Lunes</td>
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<td>Martes</td>
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<td>Miércoles</td>
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<td>Jueves</td>
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<td>Viernes</td>
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<td>Sábado</td>
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<tr>
<td>Domingo</td>
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</table>

10. ¿Estuviste enfermo esta última semana o algo impidió que hicieras normalmente actividades físicas? (Señala sólo una)

Sí.................................................................
No.................................................................

Si la respuesta es sí, que impidió:........................................................................