THE VALIDITY AND RELIABILITY OF THE PHYSICAL ACTIVITY QUESTIONNAIRES (PAQ-A) AMONG INDONESIAN ADOLESCENTS DURING ONLINE AND BLENDED LEARNING SCHOOLING

Atikah Rahayu1ABCDE, Sumaryanti1ABCDE and Novita Intan Arovah1ABCDE

1Yogyakarta State University

Authors’ Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

Corresponding Author: Novita Intan Arovah, E-mail: novita@uny.ac.id
Accepted for Publication: April 8, 2022
Published: June 25, 2022
DOI: 10.17309/tmfv.2022.2.04

Abstract

Research objectives. This study aimed to validate the use of the Physical Activity Questionnaire Adolescent (PAQ-A), a physical activity instrument widely used in a school setting, among Indonesian adolescents, particularly during blended learning or online schooling due to COVID-19 restrictions.

Materials and methods. This study was a cross-sectional survey of 370 Indonesian adolescents (62.2% female, mean 15±2 years) participating in online and blended learning. Participants completed the Indonesian version of the PAQ-A online. Sixty-three (17%) participants completed the same questionnaire one week later (second survey) for the test-retest reliability, from which the intraclass correlation coefficients (ICC) were calculated. Internal consistency reliability was calculated in both surveys, while confirmatory factor analysis (CFA) was analyzed from the data in the first survey.

Results. The Cronbach alpha of the PAQ-A for the first and second surveys was 0.78 and 0.82, thus indicating the acceptability of internal consistency reliability. The ICC for all PAQ-A items ranged from 0.40 to 0.81, indicating fair to excellent test and retest reliability. The root means square error of approximation was 0.033 suggesting acceptable construct validity of the instrument.

Conclusions. In conclusion, sufficient evidence shows the validity and reliability of the PAQ-A to justify the use of the questionnaires for measuring physical activity levels in the Indonesian adolescents in the blended learning or online schooling setting.

Keywords: validity, reliability, physical activity questionnaire, adolescents, Indonesia.

Introduction

One of the objectives of physical education in school is to promote physical activity, as an important aspect of growth and development among children and adolescents (Trudeau & Shephard, 2008). Moreover, regular physical activity has been found to provide various benefits for physical, mental, and psychosocial health, all of which are essential for optimizing learning, thus, it fosters improved academic performance among children and adolescents (Erwin et al., 2012). Regular physical activity also plays a critical role in health maintenance (WHO, 2018; Chooi et al., 2019), and in preventing non-communicable diseases (NCD) (Badr et al., 2017; Choukem et al., 2020; Geidl et al., 2020), such as diabetes mellitus, hypertension, heart disease, cancer, and stroke (Kinlen et al., 2018; Longo et al., 2019). For optimum health benefits, the World Health Organization (WHO) recommends at least 60 minutes per day of moderate or high-intensity physical activity for adolescents (WHO, 2018). Despite this recommendation, however, physical activity level is declining among adolescents globally and in Indonesia (WHO, 2020; Ministry of Health Republic of Indonesia, 2018), while physical inactivity increased from 70% in 2018 to 81% in 2020 in Asian countries (WHO, 2018; WHO, 2020). Therefore, physical activity promotion should be a public health priority among Indonesian adolescents.

Interventions to promote physical activity are essential in this age group because adolescents experience rapid physical, psychosocial, and cognitive development (Regwelski et al., 2019), affecting their physical activity. Moreover, behavioral interventions in this stage are critical since physical activity
is likely to continue into adulthood (Psaltopoulou et al., 2019; Chaudhry et al., 2020; Flodgren et al., 2020). These interventions require valid and reliable instruments for measuring physical activity. However, although several instruments have been widely used to measure physical activity, such as the International Physical Activity Questionnaire (IPAQ) and Global Physical Activity Questionnaire (GPAQ) (Keating et al., 2019), only a few instruments were available for assessing physical activity among adolescents.

One of the instruments is the Physical Activity Questionnaire-Adolescent (PAQ-A), which is considered a brief and comprehensive instrument which is widely used in the school setting. The validity of the PAQ-A during the instrument development was reported by Kowalski et al. (1997) among eighty-five students in grades 8 to 12. They demonstrated a significant correlation of the PAQ-A with physical activity rating \( r = 0.73 \), the leisure time training \( r = 0.57 \), a caltrac motion sensor \( r = 0.33 \), and the seven days of physical activity recall interview \( r = 0.59 \) (Kowalski et al., 1997).

However, while the PAQ-A has demonstrated good validity and reliability in the countries such as Canada (Kowalski et al., 2004), England (Aggio et al., 2016), Poland (Wyszynska et al., 2019), Turkey (Polat et al., 2021), Malaysia (Koh et al., 2020), Ethiopia (Andarge et al., 2021), and Thailand (Pratanaphon et al., 2020), the validation of the instrument during online or blended learning due to school closure or social restriction associated with COVID-19 preventive measures have not been reported in the literature, including in Indonesian setting. This study, therefore, aimed to evaluate the validity and reliability of the Indonesian version of the PAQ-A in the Indonesian adolescent population during blended learning or online schooling due to the COVID-19 restriction. It is expected that the validated instruments could be used as a basis for evaluating physical activity levels among adolescents in this setting.

**Materials and methods**

**Study participants**

This research was a cross-sectional study assessing the psychometric properties of the Indonesian version of PAQ-A among adolescents in the school setting (online and blended learning). The research involved 370 Indonesian adolescents between 11-18 years old. Of those, 63 (17%) participated in the second survey for the test and retest analysis following the week. Participants were provided with written consent and parental consent. The research protocol was approved by the Human Ethics Committee of Universitas Gadjah Mada (approval No. KE/FK/1052/EC/2021).

**Instrument and Scoring Procedures**

PAQ-A assesses physical activity levels for adolescents in grades 9 to 12 or ages 11 to 18 in a school setting. PAQ-A consists of nine questions about daily physical activity during the week, in and outside the school for the last week. The first question contains sixteen questions that specifically discuss the time used for specific types of physical activity/sports usually carried out by adolescents. Question #2 to #7 ask for their physical activity during leisure time, physical education, lunch, after school, evening, weekend. Item #8 ask the frequency of physical activity during each day of the last week, while the ninth question review changes in physical activity compared to the previous week. For the first eight items, the score ranges from 1-5, in which the highest score indicates a higher physically active level. Scores for item #1 and item #8 are the average of the responses. The final score if PAQ-A is the average of items #1 to #8.

**Statistical Analysis**

Participants completed the Indonesian version of the PAQ-A online (first survey). They were again contacted in the following week to complete the online questionnaire (second survey). In the first survey, they have also completed questionnaires asking their age, weight, height, family history of obesity, study mode (online or blended), type of school (public or private), and duration of time they spend engaging in moderate-vigorous physical activity.

Age data were categorized into two groups (i.e., early adolescents ranging from 11 to 14 years old, and middle adolescents from 15 to 18 years old). Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared and was categorized into underweight (<18.5), normal (18.5-23.5), and overweight (>23.5). The family history of obesity was organized into two: the presence and absence of obesity in both the father and or mother, grandfather, and grandmother. Time engaging for physical activity was divided into <60 minutes/day and 60 minutes/day. Group comparisons were made between participants who completed only the first survey and completed twice based on those characteristics using the Pearson Chi-Square test.

Internal reliability consistency of PAQ-A was assessed using Cronbach Alpha, with less than 0.70 to indicate acceptable reliability (Sharma, 2016). We also calculated one-week- test and retest reliability on both the PAQ-A by calculating each item’s intra-class correlation (ICC) (single oneway model). The ICC 0.4 to 0.59 was considered fair, >0.60 was considered good, and the ICC >0.75 was considered excellent (Schreiber, 2006). To assess the construct’s validity, confirmatory factor analysis (CFA) was used to determine the goodness of fit of the observed data using the hypothesized model structure. Several goods of fit criteria indices were used. First, chi-square \( (X) \) of less than 3.00 indicated a good fit (Schreiber, 2006). Second, the Root Mean Square Error of Approximation (RMSEA) less than 0.08 indicated a good fit (MacCallum et al., 1996). Next, the Comparative Fit Index (CFI) and Tucker Lewis Index (TLI) of >0.90, and the standard value of the root mean Square Residual (SRMR) of <0.08 were also indicators of a good fit (Hu & Bentler, 1999). We also calculated the loading factor for each PAQ-A with factor loadings of 0.30 to 0.50 considered low, 0.50 to 0.70 considered moderate, and 0.70 considered good (Shevlin & Miles, 1998). Data were analyzed using SPSS® version 21.0 (IBM Corp., Armonk, NY, USA), except the CFA uses Lisrel version 8.80 (Juli, 2006., by Karl Joreskog and Dag Sorbom. Scientific Software International, Inc, Copyright 2006) (Joreskog, & Sorbom, 1993).

**Results**

**Participants Social Demographic Characteristics**

Three hundred and seventy participants completed the first survey, and 63 of them completed the second survey.
### Table 1. Comparisons of Participants Sociodemographic in the First and Second Surveys

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Total * (n = 370)</th>
<th>Only completed the 1st survey (n = 307)</th>
<th>Also completed the 2nd survey (n = 63)**</th>
<th>p-value#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teenage Age (years)</td>
<td>15 ± 2</td>
<td>15 ± 2</td>
<td>15 ± 2</td>
<td>0.897</td>
</tr>
<tr>
<td>11-14 (early)</td>
<td>176 (47.6%)</td>
<td>147 (47.9%)</td>
<td>29 (46.0%)</td>
<td>0.081</td>
</tr>
<tr>
<td>15-18 (middle)</td>
<td>194 (52.4%)</td>
<td>160 (52.1%)</td>
<td>34 (54.0%)</td>
<td>0.081</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>230 (62.2%)</td>
<td>190 (61.9%)</td>
<td>40 (63.5%)</td>
<td>0.811</td>
</tr>
<tr>
<td>Male</td>
<td>140 (37.8%)</td>
<td>117 (38.1%)</td>
<td>23 (36.5%)</td>
<td>0.811</td>
</tr>
<tr>
<td>Body mass index</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight &lt;18.5</td>
<td>150 (40.5%)</td>
<td>122 (39.7%)</td>
<td>28 (44.4%)</td>
<td>0.554</td>
</tr>
<tr>
<td>Normal weight (18.5-23.5)</td>
<td>170 (45.9%)</td>
<td>141 (45.9%)</td>
<td>29 (46.0%)</td>
<td>0.554</td>
</tr>
<tr>
<td>Overweight &gt;23.5</td>
<td>50 (13.5%)</td>
<td>44 (14.3%)</td>
<td>7 (9.5%)</td>
<td>0.554</td>
</tr>
<tr>
<td>Family history of obesity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>147 (39.7%)</td>
<td>125 (40.7%)</td>
<td>22 (34.9%)</td>
<td>0.475</td>
</tr>
<tr>
<td>No</td>
<td>223 (60.3%)</td>
<td>185 (59.3%)</td>
<td>41 (65.1%)</td>
<td>0.475</td>
</tr>
<tr>
<td>Type of school</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td>280 (75.7%)</td>
<td>226 (73.6%)</td>
<td>54 (85.7%)</td>
<td>0.060</td>
</tr>
<tr>
<td>Private</td>
<td>90 (24.3%)</td>
<td>81 (26.4%)</td>
<td>9 (14.3%)</td>
<td>0.060</td>
</tr>
<tr>
<td>Learning Mode</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mix</td>
<td>170 (45.9%)</td>
<td>146 (47.6%)</td>
<td>24 (38.1%)</td>
<td>0.378</td>
</tr>
<tr>
<td>Full online</td>
<td>200 (54.1%)</td>
<td>161 (52.4%)</td>
<td>39 (61.9%)</td>
<td>0.378</td>
</tr>
<tr>
<td>Duration of time for physical activity/sports</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 60 minutes/day</td>
<td>281 (75.9%)</td>
<td>237 (77.2%)</td>
<td>44 (69.8%)</td>
<td>0.213</td>
</tr>
<tr>
<td>≥ 60 minutes/day</td>
<td>89 (24.1%)</td>
<td>70 (22.8%)</td>
<td>19 (30.2%)</td>
<td>0.213</td>
</tr>
</tbody>
</table>

### Table 2. Descriptive Statistics and Reliabilities Assessments

<table>
<thead>
<tr>
<th>No</th>
<th>Characteristics</th>
<th>First Survey (n = 370)</th>
<th>Second Survey (n = 63)</th>
<th>Corrected item-subscale</th>
<th>a if item deleted</th>
<th>Corrected item-subscale</th>
<th>a if item deleted</th>
<th>ICC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean ± SD</td>
<td>Corrected item-subscale</td>
<td>a if item deleted</td>
<td>Mean ± SD</td>
<td>Corrected item-subscale</td>
<td>a if item deleted</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Physical activity in your spare time: Have you done any of the following activities in the past 7 days (last week)? If yes, how many times?</td>
<td>1.47 ± 0.37</td>
<td>0.49</td>
<td>0.76</td>
<td>1.49 ± 0.29</td>
<td>0.55</td>
<td>0.77</td>
<td>0.79</td>
</tr>
<tr>
<td>2.</td>
<td>In the last 7 days, during your physical education (PE) classes, how often were you very active (playing hard, running, jumping, throwing)?</td>
<td>3.70 ± 0.88</td>
<td>0.25*</td>
<td>0.77</td>
<td>3.76 ± 0.96</td>
<td>0.37*</td>
<td>0.78</td>
<td>0.73</td>
</tr>
<tr>
<td>3.</td>
<td>In the last 7 days, what did you normally do at lunch (besides eating lunch)?</td>
<td>1.70 ± 1.05</td>
<td>0.12*</td>
<td>0.80</td>
<td>1.95 ± 1.29</td>
<td>0.22*</td>
<td>0.82</td>
<td>0.83</td>
</tr>
<tr>
<td>4.</td>
<td>In the last 7 days, on how many days right after school, did you do sports, dance, or play games in which you were very active?</td>
<td>2.40 ± 0.96</td>
<td>0.52</td>
<td>0.73</td>
<td>2.85 ± 1.12</td>
<td>0.69</td>
<td>0.72</td>
<td>0.65</td>
</tr>
<tr>
<td>5.</td>
<td>In the last 7 days, on how many evenings did you do sports, dance, or play games in which you were very active?</td>
<td>2.26 ± 1.13</td>
<td>0.63</td>
<td>0.71</td>
<td>2.92 ± 0.85</td>
<td>0.59</td>
<td>0.74</td>
<td>0.64</td>
</tr>
<tr>
<td>6.</td>
<td>On the last weekend, how many times did you do sports, dance, or play games in which you were very active?</td>
<td>2.15 ± 1.02</td>
<td>0.54</td>
<td>0.73</td>
<td>2.58 ± 0.69</td>
<td>0.45</td>
<td>0.76</td>
<td>0.40</td>
</tr>
<tr>
<td>7.</td>
<td>Which one of the following describes you best for the last 7 days?</td>
<td>2.14 ± 1.11</td>
<td>0.69</td>
<td>0.70</td>
<td>2.42 ± 1.03</td>
<td>0.70</td>
<td>0.72</td>
<td>0.79</td>
</tr>
<tr>
<td>8.</td>
<td>Mark how often you did physical activity (like playing sports, games, doing dance, or any other physical activity) for each day last week</td>
<td>2.31 ± 0.87</td>
<td>0.68</td>
<td>0.70</td>
<td>2.52 ± 0.81</td>
<td>0.68</td>
<td>0.73</td>
<td>0.81</td>
</tr>
</tbody>
</table>

* *corrected item-total correlation item deleted <0.4*
Table 3. Goodness-of-fit statistics of the original and PAQ-A structure (n=370)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>PAQ-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\chi^2$/df</td>
<td>1.35</td>
</tr>
<tr>
<td>RMSEA (90%CI)</td>
<td>0.033 (0.000-0.059)</td>
</tr>
<tr>
<td>CFI</td>
<td>0.991</td>
</tr>
<tr>
<td>TLI</td>
<td>0.987</td>
</tr>
<tr>
<td>SMSR</td>
<td>0.062</td>
</tr>
</tbody>
</table>

Note: df, degree of freedom; RMSEA, root mean square approximation; CFI, comparative fit index; TLI, Tucker Lewis index; SMSR, standardized root mean square residual.

Figure 1. Factor loading PAQ-A
ized guidelines (Kowalski et al., 2004; Johnson et al., 2002). Another strength was that the sample size in our study exceeded the sample size for factor analysis, thereby increasing the accuracy of the estimates (Jackson, 2003). We, however, acknowledge several limitations. First, the study sample was recruited using internet access and social media, so there are limitations in generalizing our findings to adolescents who do not have access to social media. Second, with a cross-sectional design in the study, due to resource limitation, we did not conduct convergent validity of the PAQ-A with the gold standard such as accelerometers, further research to confirm the validity of the PAQ-A compared to the accelerometers, therefore, are recommended.

Conclusions
Preliminary evidence indicates the validity and reliability of the Indonesian version of PAQ-A in Indonesian adolescents to justify the use of the Indonesian translated version of these questionnaires among Indonesian adolescents in blended learning or online school settings. Further research, however, is recommended to confirm the finding of this study.

Acknowledgement
We would like to thank the DRPM Dikti (Directorate of Research and Community Service) of the Directorate General of Higher Education for sponsoring this research in the PDD (Doctoral Dissertation Research) scheme.

Conflict of interest
All authors declare no conflict of interest.

References


ВАЛІДНІСТЬ І НАДІЙНІСТЬ АНКЕТ ІЗ ФІЗИЧНОЇ АКТИВНОСТІ (PAQ-A) СЕРЕД ІНДОНЕЗІЙСЬКИХ ПІДЛІТКІВ ПІД ЧАС ДИСТАНЦІЙНОГО ТА ЗМІШАНОГО НАВЧАННЯ В ШКОЛІ

Атіках Рахаю\textsuperscript{1ABCDE}, Сумарянті\textsuperscript{1ABCDE}, Новіта Інтан Арова\textsuperscript{1ABCDE}

\textsuperscript{1}Державний університет Джок’якарти

Южний університет Джок’якарти

Мета дослідження. Це дослідження мало на меті обґрунтування використання анкети з фізичної активності для підлітків (PAQ-A), що використовують у школі через обмеження внаслідок пандемії COVID-19.

Матеріали та методи. Це дослідження становило сьогодення перехресне опитування 370 індонезійських підлітків (62,2% жіночої статі, середній вік 15 ± 2 роки), які брали участь у процесі дистанційного та змішаного навчання. Учасники заповнили ту саму анкету через тиждень (повторне опитування) та повторно через одну, дві та чотири тижні після першого заповнення анкети.

Учасники заповнювали анкету PAQ-A індонезійською мовою онлайн. Шістдесят три (17%) учасники заповнили анкету через одну, дві та чотири тижні після першого заповнення анкети, ймовірно, через труднощі з адаптацією до віддаленого навчання.

Участь у процесі дистанційного та змішаного навчання.

Вибірка та призначення.

Вибірка складається з шістдесяти трьох індонезійських підлітків (62,2% жіночої статі, середній вік 15 ± 2 роки), які брали участь у процесі дистанційного та змішаного навчання. Учасники заповнили ту саму анкету через тиждень (повторне опитування) та повторно через одну, дві та чотири тижні після першого заповнення анкети.

Протягом трьох тижнів від першого заповнення анкети учасники заповнили анкету PAQ-A індонезійською мовою онлайн.

Участь у процесі дистанційного та змішаного навчання.

Результати дослідження.

Важливим результатом дослідження є виявлення ідентифікації анкети PAQ-A як надійної, інформативної і здатної адаптуватись до умов дистанційного навчання. Анкета PAQ-A надійно відображає фізичну активність підлітків і забезпечує точне залучення даних через перехресне опитування.

Заключення.

Дослідження показало, що анкета PAQ-A надійна та інформативна для вимірювання рівня фізичної активності підлітків, особливо під час змішаного або дистанційного навчання. Дослідження дає можливість використовувати анкету PAQ-A як інструмент для моніторингу фізичної активності підлітків, особливо під час змішаного або дистанційного навчання.

Дани результати допоможуть учителям та навчальним організаціям у процесі визначення індивідуальних потреб у фізичній активності у процесі дистанційного навчання.

Література.


ISSN 1993-7989 (print). ISSN 1993-7997 (online). ISSN-L 1993-7989. Теорія та методика фізичного виховання. Том 22, № 2
Rahayu, A., Sumaryanti, & Arovah, N.I. (2022). The Validity and Reliability of the Physical Activity Questionnaires (PAQ-A) among Indonesian Adolescents during Online and Blended Learning Schooling

Information about the authors:

Atikah Rahayu: atikah.rahayu@uny.ac.id; https://orcid.org/0000-0002-2478-794X; Department of Sports Science, Faculty of Sports Science, Universitas Negeri Yogyakarta, Indonesia.

Sumaryanti: sumaryanti@uny.ac.id; https://orcid.org/0000-0002-5989-5326; Department of Sports Science, Faculty of Sports Science, Universitas Negeri Yogyakarta, Indonesia.

Novita Intan Arovah: novita@uny.ac.id; https://orcid.org/0000-0002-0779-3344; Department of Sports Science, Department of Sports Science Faculty of Sports Science, Universitas Negeri Yogyakarta, Indonesia.


Received: 22.02.2022. Accepted: 7.04.2022. Published: 25.06.2022

This work is licensed under a Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0).