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VALIDITY AND RELIABILITY OF THE INDONESIAN VERSION OF THE INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE AMONG STUDENTS: A CONFIRMATORY ANALYSIS USING THE ACTIGRAPH GT3X+ ACCELEROMETER

Muhammad Syagill Akbar¹, Jajat², Kuston Sultoni³, Yati Ruhayati⁴, Adang
Suherman⁵, Widy Dewi Nuryanti⁶

^{1,2,3,4,5,6}Sports Science Study Program, Faculty of Sports and Health Education, Universitas Pendidikan
Indonesia

Corresponding Author: jajat_kurdul@upi.edu

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Abstract : Questionnaires and accelerometers are the most commonly used instruments by researchers to analyze physical activity. This study aims to evaluate the relationship between physical activity measurements using two methods: the International Physical Activity Questionnaire (IPAQ) and the Actigraph GT3X+ device. The study sample consisted of 27 male and 23 female students from Universitas Pendidikan Indonesia. The instruments utilized in the research were the Actigraph GT3X+ accelerometer and the IPAQ. Data analysis was conducted by correlating the data obtained from the IPAQ and the Actigraph GT3X+. The results indicated that there was no correlation between IPAQ and Actigraph GT3X+ across various physical activity intensities. Further analysis is required, considering an increased sample size and minimizing self-reporting biases through a more structured approach to achieve more accurate results.

Keywords : IPAQ; Validity, Reliability, Physical Activity



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INTRODUCTION

As time progresses, awareness regarding the importance of physical activity among the community, particularly among university students, has been steadily declining (Ratnasari, 2019). According to the Health Development Policy Agency, the 2023 Indonesian Health Survey (SKI) revealed that 62.6% of individuals aged 10 years and older fall into the category of sufficient physical activity. Meanwhile, 48.7% of those who do not engage in physical activity cited lack of time as the primary reason. This data indicates that a significant portion of the Indonesian population still does not participate in physical activity.

The World Health Organization (WHO) has established guidelines for physical activity across various age groups, including adults, adolescents, and children (Bull et al., 2020). One of the main challenges in implementing these guidelines is the difficulty in accurately measuring total physical activity (PA) (Prince et al., 2008), as well as PA at different intensity levels in daily life and over extended periods (Hills et al., 2014). This issue is further compounded by the relatively high cost of instruments used to measure physical activity (Anggunadi & Sutarina, 2017).

There are many methods to measure physical activity, four of which include accelerometers (Wandani et al., 2023), questionnaires (Suwandi et al., 2024), pedometers (Ahmad et al., 2018), and logbooks (Mazzoni et al., 2017). Currently, questionnaires are considered the easiest and most realistic method for measuring physical activity, as they do not require high costs and are also suitable for studies that require large sample sizes (van de Wiel et al., 2021). One of the most commonly used questionnaires to measure an individual's physical activity is the International Physical Activity Questionnaire (IPAQ) (Handayani & Fithroni, 2017).

The IPAQ has been tested for validity and reliability in 12 countries (Craig et al., 2003). However, in 2011, the IPAQ was tested in over 23 countries (Lee et al., 2011). There have also been studies on the validity of the IPAQ that include European countries (Meh et al., 2021), highlighting its ability to measure physical activity across cultures. This is in line with the research by Henry (2005), which states that the IPAQ is easy to apply across various levels of physical activity (light, moderate, and vigorous) and is available in both short and long versions. To date, research has addressed the validity and reliability of the Indonesian version of the IPAQ (Dharmansyah & Budiana, 2021).

However, this study has not yet validated the questionnaire results by correlating them with objective measurements using an accelerometer.

Adapting the IPAQ culturally is far more cost-effective than developing a new physical activity questionnaire (Ács et al., 2020). Therefore, this study aims to publish the results of the validity and reliability of the Indonesian version of the IPAQ with the assistance of the Actigraph GT3X+ accelerometer.

METHOD

The population in this study consisted of active undergraduate students from the 2023 cohort of the Sports Science program at the Faculty of Sports and Health Education, Universitas Pendidikan Indonesia (FPOK UPI). During the initial phase of the study, participants were recruited on a voluntary basis. As a result of the recruitment process, 50 participants expressed their willingness to take part in the study, comprising 27 males and 23 females. Eligible participants were instructed to complete a research consent form prior to their involvement in the study.

The sample, consisting of students from Universitas Pendidikan Indonesia, was asked to wear an accelerometer for seven consecutive days and then complete the IPAQ (short form). Participants who agreed to participate received an informed consent form, instructions for using the accelerometer, the questionnaire (which included the IPAQ short form), and a triaxial accelerometer (Actigraph GT3X+).

After the seven-day accelerometer wearing period, participants were asked to complete a research questionnaire that included questions about their demographic characteristics (gender, age, height, and weight) and the IPAQ (short form). The IPAQ (short form) consists of 7 questions that reflect the previous 7 days.

The IPAQ data were manually entered into SPSS Data Analysis Version 23 (SPSS Inc., Chicago, IL). All IPAQ data were processed using the standardized IPAQ scoring protocol. For the purposes of this study, the device was set to record acceleration data 30 times per second (30 Hz), and participants wore the device on an elastic belt around their waist, positioned at the midline of the right hip, for seven days. This setup allowed for a comparative analysis with the IPAQ over the 7-day period. Participants were instructed to wear the monitor from the time they woke up until they went to bed, except when showering or swimming.

After the data were collected, they were processed by inputting the Actigraph GT3X+ data into the Actilife application for analysis, and the results were reported. Subsequently, statistical tests were performed using IBM SPSS Statistics 23 to process the data from both the questionnaire and the Actigraph GT3X+. A normality test was conducted initially using the Kolmogorov-Smirnov test. Since the distribution of the IPAQ and Actigraph GT3X+ data was not normal, a non-parametric test was applied.

RESULTS AND DISCUSSION

Tabel 1. Correlation Analysis

	Light Act	Moderate Act	Vigorous Act	Total PA Act
Light IPAQ	0.565			
Moderate IPAQ		0.620		
Vigorous IPAQ			0.141	
Total PA IPAQ				0.135

*Correlation is significant at the 0.05 level (2-tailed)

CONCLUSION

The p-value of 0.565 indicates that the correlation is not statistically significant, as the p-value exceeds the commonly accepted significance level of 0.05. Based on these findings, it can be concluded that there is no significant relationship between the measurement of light physical activity using the questionnaire and the Actigraph GT3X+. The correlation analysis for vigorous activity revealed a p-value of 0.141, indicating that the relationship is not statistically significant. Therefore, it can be concluded that there is no meaningful relationship between the measurement of vigorous physical activity using the questionnaire and the Actigraph GT3X+.

The correlation analysis for moderate activity showed a p-value of 0.620, which is greater than 0.5. Therefore, it can be concluded that there is no relationship between the measurement of moderate physical activity using the questionnaire and the Actigraph GT3X+. Both methods tend to produce inconsistent results when measuring moderate physical activity. The Spearman correlation analysis revealed a p-value of 0.135, which is greater than 0.05. Therefore, it can be concluded that there is no relationship between the MET values measured using the questionnaire and the Actigraph GT3X+ device. The focus of this study was to evaluate the relationship between physical activity measurements using two methods: the IPAQ questionnaire and the Actigraph GT3X+

device. The data analyzed included various intensities of physical activity (vigorous, moderate, and light), as well as total MET (Metabolic Equivalent of Task) values.

The results of this study indicate that no correlation was found between the IPAQ and Actigraph GT3X+ across different activity intensities. Although previous studies have shown a strong relationship between the variables examined, this study did not replicate those findings. (Cleland et al., 2018; Tomioka et al., 2011). This may occur due to several factors that contribute to the misalignment or low correlation between the two methods.

However, this study supports the findings that (Lavelle et al., 2020), which state that the International Physical Activity Questionnaire Short Form (IPAQ-SF) does not provide valid results in measuring physical activity compared to the objective data from the Actigraph GT3X+ accelerometer. In the context of Indonesian students, the validity of the IPAQ in its Indonesian version also showed statistically insignificant results across different activity intensities. This consistency underscores that the limitations of the IPAQ may exist across various populations and highlights the importance of using objective methods, such as accelerometers, to obtain more accurate data. This aligns with the need to develop or refine physical activity measurement instruments that are more contextually appropriate to the cultural and demographic characteristics of the population.

Differences in sample size are one of the factors that may contribute to the inconsistency in the correlation results. This is also supported by research conducted by Ottevaere et al., (2011) Although the sample in this study consisted of 50 participants, this number may not be large enough to capture significant differences in physical activity among individuals, especially considering the variability present in their physical activity reports. A limited sample size can influence statistical analysis and may affect the generalizability of the findings (Haskell & Kiernan, 2000) reduce the likelihood of finding a strong correlation between the two instruments (Strath et al., 2013).

In addition, the IPAQ relies on self-reports from participants, which depend on individuals' ability to recall and assess the level of physical activity they have engaged in. This process is often influenced by memory bias, such as the inability to accurately remember activities performed. Social desirability bias is also a contributing factor, where participants may be inclined to provide responses that align with social norms, or there may be misunderstandings related to the definitions of activity categories, such as

distinguishing between light, moderate, and vigorous activity. On the other hand, the Actigraph GT3X+ is an objective measurement tool that assesses the intensity of physical activity based on body movement (Rothney et al., 2008), providing more accurate results in detecting both the duration and intensity of physical activity (Cardon et al., 2013). The mismatch between the IPAQ and Actigraph GT3X+ may arise due to the fundamental differences in the measurement approaches employed.

This study has several limitations that should be considered. First, the limited sample size may affect the reliability of the statistical analysis and reduce the generalizability of the findings. Second, the use of self-report through the IPAQ questionnaire may introduce memory bias and social desirability bias, where participants may provide responses that align with social norms or have difficulty accurately recalling the activities they have performed. Third, the fundamental differences between the subjective method (IPAQ questionnaire) and the objective method (Actigraph GT3X+ accelerometer) in measuring physical activity contribute to the low correlation between the two instruments. Therefore, further research is needed, taking into account the increase in sample size, adopting a more structured approach to reduce self-report biases, and exploring other variables that may influence the relationship between these two physical activity measurement methods.

This study is expected to provide valuable insights by comparing two methods of physical activity measurement, namely the IPAQ (subjective method) and the Actigraph GT3X+ (objective method). This comparison helps evaluate the strengths and weaknesses of each method, which can serve as an important reference for research in the field of physical activity.

CONCLUSIONS

This study aims to evaluate the relationship between physical activity measurements using two methods: the IPAQ questionnaire (subjective) and the Actigraph GT3X+ device (objective). While previous studies have demonstrated a strong correlation between these two methods, the findings of this study do not corroborate these results, as no significant correlation was found between the IPAQ and Actigraph GT3X+ across various intensities of physical activity (light, moderate, vigorous) or total MET.

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