

## INSTRUMENT PHYSICAL ACTIVITY QUESTIONNAIRE-DISABILITY (IPAQ-D) OBSERVE TEST FOR DISABILITIES DURING COVID-19: STUDY OF VALIDITY AND RELIABILITY IN 5 COUNTRIES

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### Abstract

The importance of measuring physical activity (PA) for disabilities during the COVID-19 pandemic has created an urgent need for the availability of such tools. This study aims to have the advantages of a valid and reliable Instrument Physical Activity Questionnaire-Disability (IPAQ-D) observation test. The study participants were divided into two, 13 experts from five countries (Indonesia, Turkey, Greece, Portugal, and Bosnia & Herzegovina) to test the content validity. To assess reliability, 153 individuals with various disabilities (age = 12–25 years; gender = male and female) from five countries were included. Data collection techniques for the validity test of the IPAQ-D observe test use the Delphi technique. Then, data collection for reliability tests with survey techniques was carried out through observation using the IPAQ-D observe test by physical education teachers, trainers, parents, and disability companions with disabilities. Data analysis was divided into two segments, namely content validity using the manual content validity ratio (CVR) formula, while the reliability test used the test-retest reliability analysis procedure with the Pearson correlation. The results revealed that: 1) The IPAQ-D observe test instrument had high validity, 0.934. This means that this instrument is highly suitable for measuring the PA of persons with disabilities; 2) the IPAQ-D observe test instrument had high reliability, with a reliability test-retest (ICC) of 0.90 and concurrent validity (PC) of 0.917. This means that this instrument offers high consistency for measuring PA of people with disabilities. IPAQ-D observe test offers the advantage that it can measure the PA of people with disabilities, ages 12–25, with high validity and reliability, through tests and measurements conducted by observers. For future research, there is a need to develop IPAQ-D observe test considering the culture of the concerned country, but it is necessary to pay attention to the conceptual, metric, and linguistic equality of the development version with the original version (IPAQ-D observe test) in English.

**Key words:** *physical activity, disability, COVID-19, obesity, healthy, instrument, validity, reliability, cross country.*

### Introduction

Coronavirus disease known by the abbreviation "COVID-19", is a global pandemic caused by the corona virus that first appeared in Wuhan China in December 2019 (Chen et al., 2020; Demirci & Phytanza, 2021; Stratton, 2020; Widodo & Najibuzzamzam, 2021) and then spread across the world. The World Health Organization (WHO) has made an official announcement regarding this pandemic starting January 30, 2020 (Burhaein, Demirci, Lourenço, Németh, & Phytanza, 2021; WHO, 2020). The impact of COVID-19 is so complex that it has led to policy changes in most countries.

One of these policies is the existence of a lockdown policy and similar measures that require people to stay at home (Brom, Lukavsky, Greger, & Hannemann, 2020; Wu & Zha, 2020). This applies to all groups including people with disabilities (Burhaein, Phytanza, & Demirci, 2020; Phytanza, Burhaein, &

Pavlovic, 2021). The policy has the potential to cause in-active behavior as people use the internet more and devices such as smartphones for entertainment, leading to a sedentary lifestyle (Phytanza & Burhaein, 2020; Purwanto, Lumintuarso, & Burhaein, 2021; Putra, Purwanto, & Burhaein, 2021).

The cause of the COVID-19 pandemic is suspected to be the SARS-CoV-2 virus has been threats that will destroy the life of human society, in this case health, economy as well as lifestyle. Generally, the lungs and respiratory tissue will be attacked and infected by the virus first, looking at extreme cases, almost all the major organs in the body will have a detrimental impact, this often contributes to severe systematic failure for some people. Comorbidities such as preexisting pathological conditions or age, premature death accompanied by increased morbidity and mortality is the main cause (Woods et al., 2020).

Due to reasons such as hospitalization, bed rest, continuous "social distancing" and "quarantine", physical inactivity can reduce the ability of organ systems to provide resistance to viral infections and also increase the risk of damage to the respiratory, immune system, musculoskeletal, cardiovascular, and brain. A balanced diet and exercise can provide strong protection against virus attacks and aid recovery. Consequently, the suffering and harm that covid-19 can cause to a person are directly related not only to factors such as medical conditions, gender, race, and age but also the individual's lifestyle during the pandemic (Woods et al., 2020).

Public health recommendations to reduce and prevent the spread of virus (i.e., closure of parks, closure of gyms, and stay-at-home orders) increase the potential for sedentary behavior by reducing daily of physical activity (PA). These recommendations are, therefore, unfortunate. Daily exercise opens the way to a strong immune system. It can help combat the disease by eliminating some of the comorbidities such as obesity, hypertension, diabetes, and severe a weak heart condition will make it against a severe COVID-19 virus (Jr Siordia, 2020).

Special attention should be paid to providing support to people with disabilities, who are not only at higher risk of COVID-19 infection but also have greater difficulty working as well as doing physical inactivity itself, which leads to worsening of their health (UNICEF, 2020).

The COVID-19 outbreak exposed certain vulnerable groups of people to greater danger, such as those with health problems, mental disorders and socially and economically weaker groups, such as the elderly, pregnant women, homeless and people with mental health conditions (Burhaein, 2020). According to the non-disabled population, adults with disabilities are three times more likely to develop heart problems, diabetes, stroke or cancer. Additionally, they have difficulty in accessing health services and face other health problems due to lack of PA. It is therefore not surprising that people with intellectual disabilities are at increased risk of COVID-19 infection, as well as at increased risk of health complications and adverse outcomes in the event of infection.

The cognitive deficits of people with intellectual disabilities can limit their understanding of important information or force them to rely on caregivers and professionals in their environment, leading to a reduction in the usual moderate physical activities in which they participate daily. Thus, they are more prone to obesity compared to the non-disabled population, which exposes them to the risk of more serious consequences in the case of COVID-19 infection (Courtenay & Perera, 2020).

According to the level of PA, we distinguish between physically inactive, insufficiently active (minimally active) and sufficiently active persons. Although PA has been considered a necessary component of a healthy lifestyle for many years, recommendations on its intensity and amount have changed significantly.

A total of 150 minutes (moderate intensity) or 75 minutes (high intensity) PA per week has been recommended more recently. Health improvement is enhanced if the recommended 30 minutes of moderate-intensity activity per day is increased by an additional 30 minutes (60 minutes in total). In addition to aerobic exercise, it is advisable to practice at least twice a week those exercises that improve musculoskeletal fitness, such as exercises to develop and maintain muscle endurance and flexibility. Additional exercises help control body weight, improve muscle strength and endurance, and help maintain functional abilities that enable long-term implementation of daily physical activities and improve quality of life (Blair, Lamonte, & Nichaman, 2018).

Due to the positive effects of PA and physical exercise, especially in the case of disabled people, daily physical exercise should be applied according to individual abilities (Burhaein, Tarigan, & Phytanza, 2020). In social isolation conditions, physical activities of individuals are limited, which increases time spent sitting, playing, lying down, using mobile communication devices, and watching television. Sedentary behaviors increase the risk of chronic health conditions and reduce energy consumption. This condition adversely affects a person's quality of life. (Zhang & Liu, 2020).

According to a study conducted in China, the mental health status of person who were active PA before the Covid-19 undergo drastic and significant changes during a pandemic (Zang, Wang, Rauch, & Wei, 2020). PA has neuroprotective effects that reduce psychopathological symptoms. The mechanism that explains the positive effect of PA on mental health is a neurobiological mechanism in which there is an increase in cerebral blood flow in the subcortical and cortical areas, utilization and synthesis of neurotransmitters, neurogenesis, and neurotrophic factors (Gokce, Gunes, & Nalcaci, 2019). Increasing PA suggested as a new treatment alternative in the treatment of mental illnesses (Mammen & Faulkner, 2013).

PA is associated with improved mood and increased psychological well-being. Someone who is active in PA will have better cognitive function and be less anxious and depressed compared to those who lead an inactive lifestyle. Conversely, people who do not move are 1.5 times more likely to become depressed and anxious than those who maintain a physically active lifestyle. Also, being physically active is a preventive factor for the development of Alzheimer's disease and increasing blood flow that supports the growth and development of nerve cells (Melzer, Kayser, & Pichard, 2004).

PA ensures, maintains and improves a healthy lifestyle, health and well-being. Although a certain type of lifestyle can be adopted in the prenatal period, it is never too late to change and create life habits that result in good health and well-being (Hekmatpou, Shamsi, & Zamani, 2013). PA performed regularly during the ongoing epidemic.

As a cheap, integrative way and effective, PA makes an important contribution to the protection of the mental health of communities. Exercise is very important to improve health, because of the relationship between PA and health. It is very important to increase and encourage public awareness to maintain, protect, and improve the individual health during the epidemic and normal times by increasing regular PA. It should be saved in mind that PA plays a very important role in coping with the COVID-19 effect, which has an unpredictable future (Ozdemir et al., 2020). COVID-19 has significant mental and physical effects on athletes. It can worsen diet, cause weight gain and lead to change in emotions, depression. So, continuous training is very important to maintain mental health, as well as to reduce the risk of depression and anxiety (Geza, Matteo, Andrea, Tiziano, & Bruno, 2020). Inactivity can interfere with body fitness and the immune system (Burhaein, Ibrahim, & Pavlovic, 2020; Jones & Davison, 2019). The pandemic is an important time to improve fitness and the immune system. Physical activity is important for all groups, including people with disabilities during the COVID-19 pandemic. To find out the actual conditions in the field, it is important to measure the physical activity of people with disabilities. The International Physical Activity Questionnaire (IPAQ) is one of the most frequently used instruments to assess (Craig et al., 2003). The questionnaire aims to become a general instrument to obtain internationally equivalent data on health-related PA in non-disabled people. However, there is no PA instrument or IPAQ for disabilities that is valid and reliable. Given the urgency of an IPAQ for people with disabilities during the COVID-19 epidemic and the absence of instruments, this is the main subject of this research.

**Methods**

Based on these problems, it raises several research questions as follows:

- 1) How to test the validity of the International Physical Activity Questionnaire-Disability (IPAQ-D) instrument to observe the test?
- 2) How can the reliability test of the IPAQ-D test be performed?
- 3) What are the advantages of the IPAQ-D Observe Test?

This study aims to have the advantages of a valid, reliable and Instrument Physical Activity Questionnaire-Disability (IPAQ-D) observation test. Based on these objectives, this study uses a quantitative research approach (Toomela, 2010).

To assess the content validity of the instrument, 13 experts (Indonesia, Turkey, Greece, Portugal, and Bosnia & Herzegovina) were recruited. To assess the reliability with 153 individuals with disabilities (age = 12–25 years old; gender = male and female) with two types of testing, namely reliability test-retest (N = 92; SD = 1.34) and concurrent validity (N = 61; SD = 1.56). People with various disabilities were recruited from five countries (intellectual disability (DD), learning disability (LD), attention deficit/hyperactivity disorder (ADHD), emotional and behavioral disorders (EBD), communication disorders (CD), deaf and hearing difficulties (DHD), blind and low vision (BLV), autism spectrum disorders (ASD), severe and multiple disabilities (SMP), and special gifts and talents (SGT).

The instrument or data collection tool in this research is the IPAQ-D observe test instrument that will be developed in this research. The IPAQ-D observe test was developed based on the International Physical Activity Questionnaire (IPAQ) (Craig et al., 2003) regular version (for non-disabled people). IPAQ-D still maintains the number of items, namely 7 items like the original version of IPAQ but with improvements to the theory and expert validation. You can see the Item Observation IPAQ-D observe test instrument in Table 1.

**Table 1.** Item Observation IPAQ-D observe test instrument

No Item	Observation
1.	Vigorous PA throughout in the last seven days.
2.	The amount of time normally spent doing vigorous PA on any of these days.
3.	Moderate PA throughout in the last seven days.
4.	The amount of time normally spent doing moderate PA on any of these days.
5.	Walk for at least 10 minutes at a time throughout in the last seven days.
6.	The amount of time normally spent doing walking on any of these days.
7.	A lot of time was spent sitting on the weekday throughout in the last seven days.

Data collection techniques for the validity test of the IPAQ-D observe test use the Delphi technique. The Delphi technique is a non-directly and structured method provides opportunities for experts or panelists to present their own ideas, knowledge, and understanding to see how someone is assesses a problem and transforms previous views into group findings (Green & Dye, 2002; Landeta, 2006). Then, the data collection technique of the IPAQ-D reliability test was observed using survey techniques (Fraenkel,

Wallen, & Hyun, 2012). The survey was performed through observation using the IPAQ-D observe test by physical education teachers, coaches, parents and disability companions with disabilities. Data analysis was divided into two, namely content validity with content validity ratio (CVR) formula's. The results of the expert assessment were then followed by data analysis techniques, the CVR formula. The CVR formula, (Ayre & Scally, 2014; Lawshe, 1975) is presented as follows.

$$"CVR" = \frac{(N_e - \frac{N}{2})}{\frac{N}{2}}$$

$N_e$  = experts who stated items "essential" (1 point)  
 $N$  = total response

Then, the data analysis in the reliability test used the test-retest reliability analysis procedure with the Pearson correlation formula and the Intraclass Correlation Coefficient through the help of the IBM SPSS 24.0 application. Additionally, paired t-test to compare mean scores of repeated measurements.

**Results**

The results of this study are divided into two, namely the results of the validity test through CVR against the IPAQ-D observe test. Reliability test results through test-retest reliability against IPAQ-D observe test.

*Validity*

According to the output of the CVR process, the mean value of the instrumental validity of the items in the instrument is 0.934 for the IPAQ-D observation-test. The output meets the minimum applicable standard according to the CVR provisions(Lawshe, 1975, 1985), the minimum CVR value for 13 experts (validators) is 0.54 (See Table 2).

**Table 2.** The Minimum Score of CVR value

Number of validators	Minimum Score*
11	0.59
12	0.56
13	0.54
...	...
40	0,29

**Table 4.** Mean & SD participants' ages

Ages (12-25 years old) Years	Test-retest Reliability (N=92)		Concurrent validity (N=61)	
	M*	SD**	M*	SD**
	16.42	1.34	17.45	1.56

Note: \*Mean; \*\*Standard Deviation

**Table 5.** Reliability Test-Retest for IPAQ-D Observe Test (N=92)

	Paired t-test (91)		ICC	
	$T_{count} > T_{table}$	*p < 0.01	ICC	*p < 0.01
IPAQ-D observe test <sup>1 &amp; 2</sup>	= 2.95 > 2.36803	0.00 < 0.01	0.90	0.00 < 0.01

Note: \*Significant at level 0.01 (significant= p<0.01) ; <sup>1</sup> Initial test; <sup>2</sup> Final test

**Table 6.** Concurrent validity IPAQ-D Observe Test (N=61)

IPAQ-D observe test <sup>1</sup>		IPAQ-D observe test <sup>1</sup>	IPAQ-D observe test <sup>1</sup>
	PC	1	.917**
	Signification (2-tailed)		.000
	N	61	61
IPAQ-D observe test <sup>2</sup>	PC	.917**	1
	Signification (2-tailed)	.000	
	N	61	61

Note: PC = Pearson Correlation ; \*\*significant= p<0.01; <sup>1</sup> Initial test; <sup>2</sup> Final test

\*One Way, p=0.05 (Lawshe, 1975, 1985)

Based on these provisions, Based on the provisions of the minimum score, the CVR results reflect accuracy and are valid for measuring the IPAQ-D observation test (See Table 3).

**Table 3.** CVR for the IPAQ-Observe Test

Items	$N_e^*$	CVR**	Interpretation
1	12	0.846	Excell.
2	13	1	Excell.
3	12	0.846	Excell.
4	13	1	Excell.
5	12	0.846	Excell.
6	13	1	Excell.
7	13	1	Excell.
Average		0.934	Excell.

Note: Excell.= Excellent; \*The number of validators giving essential evaluation; \*\*CVR formula's with 13 people as the experts (N= 13), minimum score item of 0.54.

*Reliability*

The standard interpretation of the instrument is said to have high reliability provided that the value of the reliability coefficient is greater than 0.80 (high reliability  $\geq 0.80$ ) (Mohamad, Sulaiman, Sern, & Salleh, 2015; Streiner, Norman, & Cairney, 2015). The IPAQ-D reliability test was observed using two types, namely the reliability test-retest and concurrent validity. The reliability of the test-retest obtained the results of the Intraclass Correlation Coefficient (ICC) of 0.89 or ICC = 0.89 > 0.80, so it is included in high reliability. Then in the concurrent validity using the Pearson correlation (PC), the results obtained were 0.917 or PC = 0.917 > 0.80 and so it is also considered as high reliability.

## Discussion

The vehicle serves to reveal facts as data (processed) so that a good vehicle has validity (Cook & Beckman, 2006; Kimberlin & Winterstein, 2008). Instrument products are corrected by experts and go through the verification process. At this stage, the Delphi technique is used, a tool developed by researchers with a theoretical study and refined by 13 experts from 5 different countries. This data analysis technique used CVR.

According to the CVR processing results, the mean value of validity of the IPAQ-D Observation Test tool was 0.934. These results meet the valid minimum standards according to the CVR provisions, that the minimum CVR value for several 13 validators be 0.54. (Lawshe, 1975, 1985). According to the findings, the CVR results already reflect the accuracy of the IPAQ-D observation test for measuring physical activity with disabilities.

Furthermore, a good instrument meets the requirements of consistency (reliable) which can be used repeatedly (Babiker & Herbert, 1996). Measurement consistency refers to the relative reliability of a vehicle in measurement. The vehicle serves to transform facts into data (processing) so a good vehicle not only has validity but also credibility (Cook & Beckman, 2006; Kothari, 2004). The reliability of this instrument was tested using the test-retest reliability test (Kaplan & Saccuzzo, 2013).

Based on the results of the test-retest reliability processing for each disability, the reliability value of the IPAQ-D observes that the test instrument is 0.917. These results meet the standard interpretation of reliable consistency. The reliability requirements are that the measurement results greater than 0.80 (high stability  $\geq 0.80$ ) be included in the high-reliability stability category. (Streiner et al., 2015). According to this provision, the test-retest reliability results on IPAQ-D observe test reflect reliable instrument standards for consistency and consistency to measure physical activity with disabilities.

The superiority of the IPAQ-D instrument was observed in this test compared to the original version of the IPAQ-self test by Craig et al.:

- 1) IPAQ-D observe test can be used with various disabilities. Especially for people with the kind of disabilities who participated in the research, namely: ID, LD, ADHD, EBD, CD, DHD, BLV, ASD, SMP, and SGT.
- 2) The IPAQ-D observe test instrument has high validity, 0.934. This means that this instrument is very suitable for use in measuring physical activity for people with disabilities.
- 3) The IPAQ-D observe test instrument has high reliability, reliability test-retest (ICC) of 0.90 and concurrent validity (PC) of 0.917. This means that this instrument offers high

consistency for use in measuring physical activity for people with disabilities.

- 4) The IPAQ-D observe test instrument has differences compared to non-disability instruments, namely measurement through observation by physical education teachers, trainers, parents, and disability companions.
- 5) The IPAQ-D observe test instrument is used for disabilities in the age range of 12–25 years.

Society (researchers) around the world agree that measuring PA can use IPAQ (Craig et al., 2003). Previous research has related to the validity and reliability of the IPAQ for non-disabled adults in Turkey (Saglam et al., 2010). From the survey, seven questions provide information about the duration of walking time, intense & moderately intense activity. Which in calculating the total score involves the duration (minutes) and frequency (days) of walking, intense and quite intense activity. Silent activity scores such as sitting (passive behavior level) are calculated separately. The findings agreed that each PA should be done a minimum of 10 minutes per activity.

Scores as MET-minutes / week are obtained by product of minutes, days, and MET values (multiple of resting oxygen consumption). Then the calculation of the score for walking, 3.3 MET (walking activity), 4 MET (moderate intensity activity), and 8 MET (intense activity). PA levels are classified as in-active PA (<600 MET-minutes / week), low PA levels (600–3000 MET-minutes / week), and sufficient PA levels (> 3000 MET-minutes / week) (Craig et al., 2003; Saglam et al., 2010).

In the results of the criterion validity in the study by Craig et al. (2003), the IPAQ questionnaire correlated with the results obtained using the accelerometer which was 0.30. This is similar to the results obtained in most questionnaires of this type. The reliability results of the questionnaire (obtained Spearman's correlation coefficient was  $r = 0.81$  for the longer version of the questionnaire and 0.76 for the shorter version of the questionnaire) obtained in a study conducted in 12 countries (Craig et al., 2003) indicate that the questionnaire has satisfactory metric characteristics and is suitable for researching the level of physical activity on a sample of subjects aged 18 to 65 years.

In the research on the population of middle-aged employees in Croatia, the obtained Spearman correlation coefficients ranged from 0.42 to 0.63 (Jurakić, 2009). Slightly lower reliability results compared to the study (Craig et al., 2003) were explained by the fact that the sample of respondents was chosen at random and the time period between the two measurements was somewhat longer. The reliability of the IPAQ (the Croatian version) survey was tested using the test-retest method (Pedišić, Jurakić, Rakovac, Hodak, & Dizdar, 2011) on a random stratified sample of 122 Croatian adults from the general population, aged

15 to 65 years (of which 60.1% werewomen) and on a random stratified sample of 133 students who were residents of student dormitories in Zagreb (61.1% female). A long version of the questionnaire was used, and the survey was conducted at two time points 3 to 4 weeks apart for the general population and 1 to 2 weeks for the student population.

Spearman's rank correlation coefficients between levels of PA in different fields and different intensities, found in the test and retest, ranged between 0.45 and 0.77 in the general population, and between 0.49 and 0.59 among students. Taking into account the stated results of the research, the Croatian version of IPAQ showed satisfactory reliability in assessing the levels of physical activity.

Ajman, Đapić and Novak (2015) conducted a study with the aim to check the reliability of an abbreviated version of the IPAQ survey for Croatia. The total sample of respondents was 103 students, of whom 58% were female students and 42% were male students under 19 years of age. The variables selected were related to gender, age, body weight, body height, and body mass index (BMI) determined by a specific section of the questionnaire, and students' physical activities were carried out with the composite version of the standardized IPAQ questionnaire. After data processing, Spearman correlation coefficients

between test and retest were calculated for total physical activity, which was (0.64) and for individual categories of physical activity (0.91–0.54). Experimental search revealed that the reliability of the shortened version of the IPAQ survey for Croatia is appropriate for both total physical activity and each physical activity category (Ajman, Đapić-Štriga, & Novak, 2015).

## Conclusion

IPAQ-D observe tests for disabilities can be used to measure physical activity for people with disabilities internationally because their validity and reliability was tested through a testing process involving 5 countries. However, this study still has limitations, namely the physical activity measurement tool still uses one international language, English. Recommendations for future research also need to be developed to adapt to different cultures, but it needs to pay attention to the conceptual, metric and linguistic equivalence of the development version with the original English version.

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## Conflict of Interests

The authors state that in this study there is no conflict of interest.

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