Physical Activity Level and Body Mass Index Profile of Physical Education Teacher Candidates in Palembang City

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Physical Activity Level and Body Mass Index Profile of Physical Education Teacher Candidates in Palembang City

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Abstract This study aims to determine the Body Mass Index (BMI) and Physical Activity (PA) level of Physical Education (PE) teacher candidates in Palembang during COVID-19 pandemic lockdown. A total of 552 participants (M: 307; F: 245) with minimum age of 19 years (21.27±1.66) participated in this study. This study was based on the method and used IPAQ-SF to assess PA and energy expenditure levels based on MET. The data were collected by measuring the height and weight and observing the PA behavior of the participants with an online survey using a Google form. The results of this study show that for BMI, the results showed that 247 (49.64%) were in the underweight category, 239 (43.30%) were in the normal category, 25 (4.53%) were in the overweight category, and 14 (2.54%) were in the obese category. . As for the results of physical activity levels, 62 (11.23%) were in the low category, 242 (43.84%) were in the medium category, and 248 (44.93%) were in the high category. The conclusion of this study is that the physical activity level of prospective physical education teachers is in the high category, although it was also found that there were several research subjects who had low physical activity categories. There are several factors that may produce such results. However, additional studies are needed to understand these factors.

Keywords Body Mass Index, Physical Activity, COVID-19

1. Introduction

COVID-19 has caused restrictions on people activities around the world. This condition produces changes in body mass index (BMI), which has been confirmed by several previous studies. [1] found that the lockdown period led to an increase in BMI in adolescent population. Furthermore [2] found an increase in BMI in children during the pandemic, and [3] showed that the increase in BMI in boys was higher than that in girls during the pandemic. Ironically, several studies have found that higher BMI increases the risk of COVID-19 mortality [4]–[6].

In addition to BMI, several previous studies also found that there was a decrease in physical activity (PA) levels due to the COVID-19 pandemic. [7] state that most people who previously performed sufficient PA, were forced to limit their activities due to COVID-19, and [8] showed that despite an increase in PA in people who previously less active, decreased PA level in people who were previously active tended to be higher. This happened due to changes in habits as a result of the large scale restriction during the lockdown period [9].

Several previous studies have shown that BMI and PA of college students were below the standard. A previous study showed that most students, who participated in the study, had normal weight (according to BMI), but had high levels of body fat [10]. Another study showed an increase in BMI and body fat levels in third-year college students compared to when they were in the first year, although their PA levels tended to be stable [11]. [12] state that most college students tend to prefer sugar products rather than vegetables and fruits and complain that they do not have time for regular physical activity.

While several previous studies showed that the BMI and PA level were deficient in college students during the pandemic (Chootong et al., 2022; Hossain et al., 2022; Jalal et al., 2021; Lukács, 2021), a study that specifically observed the PA level of PE major students during the pandemic reported different results. (Bayu et al., 2021) showed that out of 246 PE teacher candidates from a university in Palembang, 73.98% were in the normal BMI category and 74.80% were in the high PA level. Another study that specifically measured the BMI and PA of PE major students showed that although the majority of students were in the normal category according to BMI, those who had PA levels in the good and very good categories did not account for more than 30% [13]. The abovementioned research was conducted prior to the COVID-19 pandemic, which generated interest in researching the BMI and PA levels of prospective PE teachers who were forced to study from home during the pandemic.

Increasing PA is one of the stress-coping strategies for students; however, students usually reduce their PA while being enrolled in college (Cruz et al., 2013). Meanwhile, there is a lack of studies examining a wide range of college student lifestyle characteristics by sex and academic level of study (Müller et al., 2022). This study examined the PA level

and BMI of university students with a physical education (PE) major, who are prospective PE teachers. As prospective PE teachers, they are expected to be able to promote active and healthy lifestyle to their future students [14].

2. Materials and Methods

This study measures the PA of prospective PE teachers in Palembang city. A total of 1145 prospective PE teachers from three universities in Palembang (Sriwijaya University, PGRI Palembang University, and Bina Darma University) filled out the International Physical Activity Questionnaire–Short Form (IPAQ-SF) instrument which has specifications that are used for 15-year-old respondents and older. IPAQ-SF has appropriate predictive validity, concurrent validity, convergent validity, criterion validity, and discriminant validity as well as a good test retest, which indicated that the instrument is reliable [15], [16]. PA contents were calculated using the following formula:

MET = (3.3 × day × light activity time) + (4 × day × moderate activity time) + (8 × day × vigorous activity time) (1)

Note: the time unit is in min

3. Results Reseacrh

Than the results of Metabolic Equivalent of Task (MET) were converted using the rule that MET<600 is in the low category, 600≤MET<3,000 is in the medium category, and MET≥3,000 is in the high category [17].

Furthermore, the calculation results were categorized as follows: underweight (BMI < 18.5), ideal (BMI = 18.5-24.9), overweight (BMI = 25-29.9), and obese (BMI 30) (WHO, n.d.-b). Data collection was performed through an online survey using Google form which was sent in a structured manner via WhatsApp Broadcast. There were 552 respondents, out of 1145 respondents who filled out the survey, whose data were declared eligible for analysis; their characteristics are shown in Table 1. This study used descriptive statistics for data analysis of PA and BMI. Meanwhile, the chi-squared test was used to identify the relationship between BMI and PA.

Table 1. Participant Demographics

Category		Frequency	Percent
Gender	Men	307	55.62%
	Women	245	44.38%
Age	*Max*	25	
	Min	19	
	St. Deviation	1.66	
	Average	21.27	
Athlete/Non-Athlete	Athlete	124	22.46%
	Non-thlete	428	77.54%
Domicile	Countryside/Inland	257	46.56%
	City/ Around the regional administration center	295	53.44%
University	Sriwijaya University	204	36.96%
	PGRI Palembang	259	46.92%
	Bina Darma	89	16.12%

Table 2. Distribution of Physical Activity Frequency by Intensity

Total Days in a Week	High Intensity		Moderate Intensity		Low Intensity	
	N	***%***	***N***	***%***	***N***	***%***
0	100	18.12%	95	17.21%	14	2.54%
1	86	15.58%	118	21.38%	69	12.50%
2	96	17.39%	111	20.11%	40	7.25%
3	139	25.18%	80	14.49%	150	27.17%
4	85	15.40%	70	12.68%	55	9.96%
5	13	2.36%	23	4.17%	63	11.41%
6	8	1.45%	10	1.81%	31	5.62%
7	25	4.53%	45	8.15%	130	23.55%
Total	**552**	**100%**	**552**	**100%**	**552**	**100%**

Table 3. Distribution of Physical Activity Frequency by Duration

Total Duration in a Week (min)	High Intensity	Moderate Intensity	Low Intensity

	N	%	*N*	%	*N*	%
<10	123	22.28%	123	22.28%	38	6.88%
10-30	39	7.07%	57	10.33%	86	15.58%
31-60	161	29.17%	184	33.33%	204	36.96%
61-149	142	25.72%	122	22.10%	128	23.19%
150-299	58	10.51%	39	7.07%	41	7.43%
>299	29	5.25%	27	4.89%	55	9.96%
Total	**552**	**100%**	**552**	**100%**	**552**	**100%**

Table 4. BMI and MET Descriptive Statistics

	Category	Frequency	Percent
Height	***Max***	200	
	Min	120	
	St. Deviation	10.20	
	Average	161.22	
Weight	***Max***	93	
	Min	35	
	St. Deviation	11.25	
	Average	50.88	
BMI	***Max***	43.99	
	Min	12.35	
	St. Deviation	3.84	
	Average	19.56	
BMI Category	***Underweight***	274	49.64%
	Ideal	239	43.30%
	Overweight	25	4.53%
	Obese	14	2.54%
***Metabolic Equivalent of Task* (MET)**	***Max***	89460	
	Min	33	
	St. Deviation	7884.63	
	Average	4964.67	
MET Category	**Low**	62	11.23%
	Moderate	242	43.84%
	High	248	44.93%

Table 5. *Cross-tabulation*, correlation between BMI and PA

		Metabolic Equivalent of the Task			Total	X^2	*p*
		Low	Moderate	High			
BMI	Underweight	37	114	123	274	8,369	0,212
	Normal	23	115	101	239		
	Overweight	1	8	16	25		
	Obese	1	5	8	14		
Total		62	242	248	552		

Table 2 presents the frequency distribution of prospective PE teachers in Palembang City performing PA for one week. In the high intensity category, 25.18% of students performed PA for 3 days a week. Meanwhile, in the moderate intensity category, 21.38% of students performed PA for 1 day a week. In the low intensity category, 27.17% of students performed PA 3 days a week.

Table 3 shows the frequency distribution of prospective PE teachers in Palembang City performing PA based on duration (in min) in a week.

In the high intensity category, most students (29.17%) performed PA for 31-60 min. In the moderate intensity category, most students (33.33%) performed PA for 31-60 min. In the low intensity category, most students (36.96%) performed PA for 31-60 min.

Table 4 present descriptive statistics for the BMI and MET data.

The average BMI of prospective PE teachers in Palembang City is 19.56, SD is 3.84, the highest BMI is 43.99 in the obese category, and the lowest BMI is 12.35 in the

underweight category. The average MET of physical activity for prospective PE teachers in Palembang City is 4964.67, SD of 7884.63 in the high PA category, the highest MET of 89460 is in the high PA category, and the lowest MET of 33 is in the low PA category.

Based on the BMI and MET values that have been used as categorical data, the crosstabulation analysis was applied to determine the correlation between BMI and PA. Table 5 shows the results of the analysis using the cross-tabulation method utilizing the chi-squared value and r-Pearson as continuation test.

Cross-tabulation was performed for three categories of PA and four categories of BMI. Based on the results of the analysis, it can be explained that there is no correlation between BMI and PA as measured by the MET formula (X2: 8.369, N: 552, p: 0.212> 0.05).

Previous studies show similar results, 1.e., that the BMI and PA level of college students were deficient during the pandemic [18]–[21]. In this studi, the PE teacher candidates from three universities belonging to overweight and obese BMI categories accounted for only 7.07%, and the candidates with the combination of moderate and high PA level reached 88.77%. Obesity is a recognized risk factor for severe COVID-19 [22], [23], possibly related to chronic inflammation that disrupts immune and thrombogenic responses to pathogens [24] as well as to impaired lung function from excess weight [25]. Previous studies, which evaluated PE teacher candidates, show different results. While [26] show that the majority of PE teacher candidates from a university in Palembang were in the normal BMI category and high PA level, [27] show that less than 30% of PE teacher candidates in Bekasi, West Java, were in good PA category. The connection between BMI and COVID-19 risk is also murky and unsettled. A few studies suggest that people with higher BMIs have a higher risk of getting admitted to the ICU with COVID, needing a ventilator to survive, or dying of the disease. Some doctors point out that just having a bigger body can make it more difficult to be treated for COVID-19. A larger chest might make it harder to breathe, for instance, and ventilators were designed for smaller bodies, even though many Americans live in larger ones. A larger study of more than 10,000 veterans, [28], found that BMI was not associated with worse COVID-19 outcomes and a study of nearly 7,000 people [22] found that only male patients with BMIs higher than 40 (which represents less than eight percent of the population in the United States) had worse outcomes.

The differences that occur between the study with the sample of college students in general and PE major students may be due to differences in physical literacy. [29] state that physical literacy can be used as a tool to improve physical fitness. Although physical literacy is not explained further in this study, the comprehension related to physical literacy obtained by the PE teacher candidates during their time studying at the universities may be a factor that distinguishes them from general college students in terms of both BMI and PA levels. Only 22.46% of student athletes participated in this study and the results of this study show that not only student athletes, but also non-athlete students belonged to the good BMI and PA level category. This means that non-athlete students implemented a healthy lifestyle even though they were not required to achieve certain targets.

Another factor that results in the high PA level of PE teacher candidates in this study is the location where they live. There were differences in restrictions in different areas in Indonesia. The restrictions on Java and Bali islands were more stringent than on other islands in Indonesia, and this study was conducted in Palembang, which is located on Sumatra islands. The Indonesian government policy stipulated that arts, culture, sports, and social activities were to be temporarily closed during the lockdown period on Java and Bali islands (Minister of Home Affairs Instruction Number 27 of 2021), while sports activities were still allowed with strict health protocol implementation in Palembang (Minister of Home Affairs Instruction Number 28 of 2021). These results must still be confirmed by further studies so that the factors that cause good BMI and high PA of PE teacher candidates can be identified.

It is globally known that PE in schools aims to promote PA, and PE teachers, as promoters, should become examples of what is promoted [30]. In an educational context, students identify teachers as role models of healthy behavior [31]. While PE teachers need specific characteristics to be role models, previous studies found that some PE teachers lack in PA and health-related knowledge [32], [33]. Although it is known that the BMI and PA levels of prospective PE teachers were in the good category in this study, health-related knowledge was not investigated further.

In addition, in this study, no significant associations were observed between BMI and PA through the analysis using the cross-tabulation method. These findings are consistent with the conclusions of a previous study, which analyzed the PA level and BMI profile of working-age population in Palembang [34]. This observation shows that someone who has a good BMI not necessarily performs enough PA and vice versa. Evan if an individual performs regular PA, there are several other factors that affect the BMI category of the individual.

This study has some limitations. Specifically, the sample was obtained from three universities in Palembang and may not fully represent all PE teacher candidates in Indonesia, and the questionnaires that were used to collect data may have bias. Considering different restrictions in some regions in Indonesia, it is possible to assume that there may be different results in the BMI and PA level of PE teacher candidates across the country.

3. Conclusion

The COVID-19 pandemic has caused changes in the BMI and PA level of people in the world. However, this study shows that only few prospective PE teacher candidates in Palembang were in the overweight and obese BMI

categories, and most of them were in the combination of moderate and high PA level categories; there is no correlation between BMI and PA as measured by the MET formula. There are several factors that may generate these results, which needs to be confirmed by further studies. Future studies should evaluate the health-related knowledge of the participants and involve participants from other cities to fully represent all PE teacher candidates in Indonesia.

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