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The Effect Of Physical Activity Level On Body Mass Index During The New Normal Period

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Abstract

The level of physical activity is one indicator of whether a person is active. This study aims to see the effect of physical activity level on body mass index. The method used in this study is the correlational method which aims to detect the level of physical activity on body mass index during the new average period. The population in this study were all FIK Cenderawasih University students totalling 387 students. They determined the sample using a simple random sampling technique to obtain a sample of 97 students aged 19 – 24 years consisting of 61 men and 36 women. The data collection technique used the International Physical Activity Questionnaire (IPAQ) instrument to measure the level of physical activity and anthropometric measurements of the body to obtain BMI values. The data analysis showed that students' physical activity level was dominant in the high category 54.6%, the medium category 30.9%, and the low category 14.4%. There were differences between the activity levels of males and females. The average level of physical activity for men is in the high category, and the average for women is in the medium category. The study's results found a positive effect of physical activity on the BMI of FIK Cenderawasih University students during the new average period.

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INTRODUCTION

One of the dominant factors for the emergence of critical illness is the lack of exercise and physical activity. The data shows that the Indonesian population aged > 10 who regularly exercise is only 27% of the total population. This shows that the number of sports participation in Indonesia still needs to improve compared to other countries. UNICEF 2021 also publishes data on adolescents 15-19 years who routinely do physical activity, only 22% (UNICEF, 2021). It was further explained that entering the era of the industrial revolution 4.0, technological advances decreased people's physical activity, which impacted health and quality of life (Kardi, Widarti, and Nasri, 2020).

The study results reveal that reduced physical activity levels are hazardous for obesity (Gupta et al., 2019). Obesity is a public health problem that requires special attention because obesity is the fifth leading cause of death (Janah & Nugroho, 2021). The low level of sports participation indicates that people need to be fully aware of a healthy lifestyle through sports. The Covid-19 pandemic has forced people to do all kinds of activities at home, both working and studying. Physical activity is carried out by contracting muscles, triggering energy expenditure, and helping avoid various diseases (Kardi et al., 2020). This has an impact on the reduced level of physical activity carried out, especially in the student environment (Wungow, Berhimpong, and Telew 2021)

During the pandemic, lectures are conducted online to protect students from Covid-19 transmission, which causes a decrease in physical activity due to sitting too long during online lectures., (Utami et al., 2021). The results revealed that physical activity decreased significantly during the lockdown, and sitting time increased (Jalal et al., 2021). It is the same as what was revealed as a decrease in physical activity due to physical distancing, which limits movement to leave the house and impacts the lack of movement (Sibarani, 2021). Various studies have revealed that during the COVID-19 pandemic, people experienced changes in habits, including a lack of physical activity, so they experienced weight gain (Saragih, B and Saragih, F, 2020). Reinforced research results revealed that during the pandemic, the prevalence of lack of physical activity increased rapidly from 21.3% to 65.6% (Xiang et al., 2020). Reinforced research results reveal that the level of physical activity during online learning obtained good category data is only 7.5% (Ali, Sudirjo, and Rahman 2021). In addition, the results of other studies also reveal that adolescents who do not carry out daily activities can cause their bodies to lack energy. Therefore, if energy intake is too much and not balanced with activity, a person is prone to obesity (Irwan et al., 2020).

Assessing nutritional status is crucial because physiological changes exist, and the growth rate is increasing rapidly, especially for students (Sibarani, 2021). The study's results revealed that an imbalance between

physical activity and energy intake would lead to weight gain (Rukmana, Permatasari, and Emilia, 2021). Therefore, it is necessary to understand the community, especially students, to continue to carry out routine physical activities to maintain physical fitness and avoid exposure to Covid-19. As stated, regular exercise and physical activity at the level of physical fitness are vital to determine the balance of quality of life during Covid-19 (Pinho et al., 2020).

METHODS

This research uses quantitative research with a correlational method which aims to detect the effect of physical activity level on body mass index during the new average period for students of the Cenderawasih University Sports Science Study Program. The population in this study were all FIK Cenderawasih University students, totalling 387 students. The sampling technique used is simple random sampling, which is a random sampling technique based on the probability frequency of all populations. Determination of the sample using the Slovin formula to obtain a sample of 97 students. The sample's ages ranged from 18 - 24 years, comprising 61 males and 36 females.

The level of physical activity was measured using the International Physical Activity Questionnaire (IPAQ), which has been valid and reliable in measuring the level of physical activity of Indonesians with a Kaiser-Meyer-Olkin value of 0.910, the value of Bartlett's test of sphericity was X2 = 573,434 (df=28, p< 0.000), and Cronbach's alpha value are 0.884, (Dharmansyah & Budiana, 2021). BMI was calculated by measuring the respondent's weight and height. Physical activity data were collected by distributing IPAQ questionnaires to respondents, which consisted of four domains, namely; 1) Domain of activity related to learning/work activities, 2) Domain of physical activity in transportation, 3) Domain of activity at home or dormitory, 4) Domain of recreational activities, sports, or physical activity in leisure/relaxing time, 5) Domain of Time for sitting, the sitting time in question does not include the time while driving/transportation. To obtain the BMI value, weight measurement was carried out with a digital scale and height measurement with a stature meter.

Assessment of the respondent's level of physical activity in the last week is used to determine whether the respondent's level of physical activity is in the high, medium, or low category. Each domain has a formula for calculating the level of physical activity, namely:

1) The domain of work or study
   a. Walk to work/campus = 3.3 x how many minutes of walking x number of days**.**
   b. I am doing the moderate-intensity activity at work/campus = 4.0 x how many minutes of moderate-intensity activity x number of days of moderate activity.
   c. I am doing heavy-intensity activities at work/campus = 8.0 x how many minutes of heavy-intensity activity x number of days of strenuous activity.

Total MET/week = number of walks to work/campus + moderate-intensity activity + vigorous-intensity activity.

2) Transportation Domain
   a. I am walking = 3.3 x how many minutes of walking x number of days walking.
   b. Cycling = 6.0 x number of minutes of cycling x number of days.

   Total MET/week = number of walks as transport + cycling.
3) Domain Activities at Home
   a. I am doing the heavy-intensity activity outside the home = 5.5 x how many minutes of vigorous-intensity activity x number of days of vigorous-intensity activity.
   b. I am doing moderate-intensity activities outside the home = 4.0 x how many minutes of moderate-intensity activity x number of days of moderate activity.
   c. I am doing the moderate-intensity activity at home = 3.0 x how many minutes of moderate-intensity activity x number of days of moderate activity.

   Total MET/week = the number of vigorous-intensity activities outside the home + moderate-intensity activities outside the home + moderate-intensity activities indoors.
4) Leisure/Sports Domain
   a. I walked in free time = 3.3 x how many minutes of walking x number of days walking.
   b. You are doing the moderate-intensity activity in your spare time = 4.0 x how many minutes of moderate-intensity activity x the number of days of moderate-intensity activity in your spare time.
   c. You are doing the heavy-intensity activity in your spare time = 8.0 x how many minutes of heavy-intensity activity x the number of days of heavy-intensity activity in your spare time.

   Total MET/week = total walking activity + moderate-intensity activity + heavy-intensity activity in leisure time.
5) Sitting Time Domain
   a. Total sitting time (minutes/week) = how many minutes of sitting on weekdays/study x 5 days of work/study + how many minutes of sitting x 2 days on weekends.
   b. Average sitting time (Minutes/day) = (how many minutes sitting on weekdays/study x 5 days of work/study + number of minutes sitting x 2 days on weekends) / 7.

After the number of METs was calculated based on five domains, the scores obtained were adjusted according to the category of physical activity level. The categories for assessing the level of physical activity are as follows:

Table 1. Categories of Physical Activity Levels

Categories	Explanation
High	1. I am doing heavy physical activity for three days with a MET value of 1500/week. 2. Do the physical activity for seven days with a minimum MET value of 3000 minutes/week.
Moderate	1. I am doing a high-intensity activity for at least 20 minutes/per day for three days. 2. Do moderate-intensity activity for five days, at least 30 minutes/per day. 3. I am doing physical activity for five days with a total MET of 600 – 1499 minutes/week.
Low	I am doing a physical activity with a MET value < 600 minutes/week.

BMI assessment was conducted to determine the respondent's body condition using BB: (TB2). The BMI value obtained describes whether the respondent is in the thin, normal or obese category. For adults > 18 years, the categories as shown in table 2 are used.

Table 2. BMI category

BMI	Category	
< 17,0	Thin	Severe weight loss
17,0 – 18,4		Mild weight loss
18,5 – 25,0	Normal	
25,1 – 27,0	Fat	Mild overweight
> 27,0		Excess weight

FINDINGS AND DISCUSSION

Findings

Data was obtained through the International Physical Activity Questionnaire (IPAQ) questionnaire, filled out online by respondents, namely students of the Faculty of Sports Science, Cenderawasih University, totalling 97 people, measuring height and weight to determine the respondent's BMI. The data is then processed using SPSS.

Description. After the data is collected, the data analysis process is carried out to determine the characteristics of the respondents consisting of age and gender. The results of the data analysis can be seen in table 3. Based on the results of descriptive data analysis, it is known that the age of the respondents ranged from 18 to 24 years, consisting of 127 males and 70 females. This shows that at FIK Universitas Cenderawasih, the male gender tends to be more dominant.

Results of Data Analysis Respondents'

Table 3. Characteristics of Age and Gender of Respondents

Age	Frequency	Percentage (%)
19	7	7,2
20	16	16,5
21	10	10,3
22	30	30,9
23	18	18,6
24	16	16,5
Total	97	100
Gender	Frequency	Percentage (%)
Male	61	64,5
Female	70	35,5
Total	36	100

Results of Data Analysis of Physical Activity Levels. Based on data obtained from respondents, it was found that the level of physical activity of FIK students at Cenderawasih University during the new average period can be seen in table 4.

Table 4. Level of Student Physical Activity

Category	Frequency	Percentage (%)	Average Day/Week	Average Time/exercise session
High	53	54,6	3	47 minute
Moderate	30	30,9	3	36 minute
Low	14	14,4	4	38 minute

Based on the results of data analysis in table 4, it can be concluded that the level of physical activity of FIK students at Cenderawasih University is dominant in the high category. This is based on the findings that the value of the high category is 54.6%, the medium category is 30.9%, and the low category is 14.4%.

The average high-intensity physical activity carried out by FIK Cenderawasih University students is 3 days/week with an average duration of 47 minutes/per exercise session. The average moderate-intensity physical activity carried out by FIK Cenderawasih University students is three days/week with an average duration of 36 minutes/per exercise session. The average high-intensity physical activity carried out by FIK Cenderawasih University students is four days/week with an average duration of 38 minutes/exercise session.

Table 5. Sitting Duration

Time (Minute)	Frequency	Percentage (%)	Average time Sitting/day
90 – 150	67	69,1	
151 – 210	8	8,2	
211 – 270	2	2,1	164 Minute
270 – 330	12	12,4	
331 – 390	8	8,2	
Total	97	100	

Based on the data obtained in table 5, it can be concluded that the student sitting during online learning is between 90-150 minutes/day, five days/week, because the average student lectures five days/week. However, it was found that the average student sitting duration during online learning was 164 minutes/per day. The intended duration of sitting does not include sitting in transportation and other activities.

Table 6. Differences in Physical Activity Levels of Male and Female

Male			Female			Average MET	
Category	Frekuensi	Percentage (%)	Category	Frekuensi	Percentage (%)	Male	Female
High	28	45,9	High	16	44,44	2300,7	1322,1
Moderate	19	31,15	Moderate	12	33,33	MET/week	MET/week
Low	14	22,95	Low	8	22,22		
Total	61	100	Total	36	100	High	Moderate

Based on the results of data analysis in table 6, it can be concluded that the level of physical activity of FIK students at Cenderawasih University is different between men and women. The findings show that the average MET score for males is in the high category, while the average MET for females is in the moderate category. This is based on the finding that the average level of physical activity for males is 2300.7 MET/week, while the level for females is an average of 1322.1 MET/week.

Results of Body Mass Index Data Analysis. Based on data obtained from respondents, it was found that the BMI of FIK Cenderawasih University students during the new average period can be seen in table 7.

Table 7. Student BMI

Category	Frekuensi	Persentase (%)	Keterangan	(%)
Severe weight loss	3	3,1	Thin	10,3
Mild weight loss	7	7,2		
Normal	69	71,1	Normal	71,1
Mild overweight	7	7,2	Fat	18,5
Excess weight	11	11,3		
Total	97	100		

Based on the results of data analysis in table 7, it can be concluded that the BMI of FIK Cenderawasih University students is dominant in the normal weight category. This is based on the finding that the BMI is in the thin category at 10.3%, 71.1% normal category and 18.5% in the fat category.

In addition, the data analysis found differences in BMI between males and females. The results can be seen in table 8.

Table 8. Student BMI by Gender (Male and Female)

Male			Female			Average BMI	
Category	f	(%)	Category	f	(%)	Male	Female
Severe weight loss	1	1,6	Severe weight loss	2	5,6		
Mild weight loss	4	6,6	Mild weight loss	3	8,3		
Normal	44	72,1	Normal	25	69,4	22,55	21,90
Mild overweight	5	8,2	Mild overweight	2	5,6		
Excess weight	7	11,5	Excess weight	4	11,1		
Total	61	100	Total	36	100	Normal	Normal

Based on the results of data analysis in table 8, it can be concluded that the BMI of FIK students at Cenderawasih University is different between men and women. The results showed that the BMI in the thin category was more dominantly experienced by women, namely 13.89%, while the thin category for men was 8.20%. BMI in the normal category is more dominant in men, namely 72.13%, while women are 69.44%, and BMI in the obese category is more dominant in men, namely 19.68%, while women are 16.67%.

However, it was found that the average BMI value for males and females was dominant in the normal category. This is based on the findings that the average BMI for males is 22.55 in the range (of 18.5 – 25.0) and the BMI for females is 21.90 between the range (of 18.5 – 25.0).

Effect of Physical Activity Level on BMI. Based on the data obtained from the respondents, it was found that there was an effect of the level of physical activity on the BMI of FIK Cenderawasih University students during the new average period. The results obtained using regression analysis can be seen in table 9.

Table 9. Regression Test Results

Sig.	R Square
.026	.510

Based on the results of the regression test analysis obtained the value of sig. of 0.026 < 0.05, it can be concluded that the effect of the level of physical activity on the BMI of FIK students at Cenderawasih University. Based on the regression test results, the R square value of 0.510 means that physical activity affects 51% of the respondent's BMI.

Discussion

This study shows that activity level has an impact on BMI. Physical activity is an essential factor affecting a person's Body Mass Index. The results of previous research showed a significant relationship between physical activity and the Body Mass Index of Semester 4 PJKR students at the Faculty of Sports Science, Yogyakarta State University, in 2019 (Anjarwati, 2019). Similarly, the research results show an influence between physical activity and the BMI of FK UISU students (Magdalena & Ariati, 2021).

Based on this, it can be concluded that more frequent physical activity, whether low-intensity, moderate-intensity, or high-intensity physical activity, impacts health, including standard body composition, which can be seen in the BMI value. The results of previous studies have revealed a significant relationship between physical activity and BMI (Wijaya, Muliarta, and Permana 2020). However, this study found a need for more frequency and duration of physical activity by FIK students at Cenderawasih University. This is thought to be due to the Covid-19 pandemic, which requires online learning with the implementation of the

lockdown. After the pandemic, experienced a decline in the need for awareness for physical activity for all ages to be active every day. Therefore it needed the support of all parties (Kardi, Widayati, and Wahyuni 2019). This is because physical activity is the best alternative as a natural therapy to increase immunity against the Covid-19 virus (Hita et al., 2020).

The impact of the Covid-19 pandemic is so significant in every aspect of life, including in the field of education. The implementation of direct online learning has reduced the frequency of physical activity because students have to sit down to take lessons without having to go to campus. The findings in the field revealed that FIK Cenderawasih University students carried out heavy-intensity physical activities on average three days/week with an average duration of 47 minutes, moderate-intensity activities on average three days/week with an average duration of 36 minutes, and low-intensity activities. An average of 4 days/week with an average duration of 38 minutes. Based on these findings, it can be concluded that FIK Cenderawasih University students did not carry out programmed physical activities during the new average period. However, students continued to move by helping their families work in the fields, at sea and at lakes.

The results of a study in California also revealed that during the Covid-19 pandemic, the level of physical activity decreased dramatically (Chaffee et al., 2021). It was further explained that students' physical activity levels decreased, lack of movement increased significantly, and students were not involved in sufficient physical activity during Covid-19 (Bertrand et al., 2021). The study's results also revealed that the impact of Covid-19 on physical activity had drastically decreased, including a decreased frequency of 35%, a decreased duration of 34%, and a decreased intensity of 42.7% (Lesser, 2020).

Lack of physical activity causes much energy to be stored as fat, so people who do less physical activity tend to be overweight, even obese. The findings in the field revealed that FIK students at Cenderawasih University had an average BMI of 71.1%, 18.5% fat, and 10.3% thin. This happens because most students live in mountainous areas, valleys, and the coast, so while studying online, students continue to help their families work in the fields, such as gardening and farming. Those who live on the coast help their families catch fish. Based on this, most students continue to do physical activities and spend energy, thus maintaining a normal BMI, even though physical activity is not as routine as before the pandemic. The results of previous studies also revealed that both men and women experienced a significant decrease in anthropometric and physical performance during the Covid-19 pandemic (Alexander & Clayton, 2020).

CONCLUSION

Based on the results obtained, the level of physical activity of FIK students at Cenderawasih University is dominant in the high category; besides that, there is a difference between the activity levels of males and females. The average level of physical activity for males is in the high category, and the average for females is in the medium

category. The results showed that the BMI of the dominant students was in the normal category. Based on these results, there is an effect of the level of physical activity on the BMI of FIK Cenderawasih University students in the new average period.

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