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## **Student Daily Calorie Intake and Physical Activity Levels during the COVID-19 Pandemic**

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### **Abstract**

The level of physical activity is an indicator of being active or inactive. This study aimed to determine students' daily calorie needs according to their physical activity levels during the Covid-19 pandemic. This research was a quantitative descriptive research with a cross-sectional design. The population of this study included 588 FIK Cenderawasih University students. For the sample, the simple random sampling technique was used. The samples of this study involved 95 students aged 19–24 years, consisting of 60 males and 35 females. The data collection employed the International Physical Activity Questionnaire (IPAQ) and anthropometric measurements to determine BMI to calculate the student's daily calorie needs. The results of data analysis showed that the level of physical activity of students was primarily in the moderate category, 52.6%, while the rest 47.4% of students were in the high category. The findings show that the average of student needs was 3101 calories/day. In addition, there were differences in calorie needs between males and females. The average energy intake for males was 3363 calories/day, while for females was 2389 calories/day. Based on the results obtained, the higher the physical activity, the higher the calorie intake.

## INTRODUCTION

The dominant factor of the emergence of critical illness is the lack of exercise and physical activity. Data show that only 27% of the total Indonesian population aged >10 years who regularly exercise (BPS 2020). It shows that the number of people participating in sports in Indonesia is still low compared to other countries. UNICEF, in 2021, also published data that only 22% of teenagers aged 15–19 years who routinely engage in physical activity (UNICEF 2021). It was further explained that upon entering the era of the industrial revolution 4.0, there were advances in information. Technology resulted in a decrease in physical activity, which had an impact on health and quality of life (Kardi. I. S, Widarti. R. & Nasri, 2020). Physical activity, which includes all kinds of body activities including sports, is an effort to balance the expenditure and intake of nutrients, especially energy sources in the body. Physical activity requires energy. In addition, physical activity also facilitates the metabolic system in the body, including nutrient metabolism. Therefore, physical activity plays a role in balancing the nutrients consumed and excreted by the body (PMK No. 41 2014). The 2015-2020 Dietary Guidelines for Americans recommends a calorie intake of 3200 calories for active men aged 16 - 18 years and as they age, their metabolic rate slows down which results in reduced energy needs (Ismail 2018). In Indonesia, there is a table of nutritional adequacy numbers according to the Minister of Health Regulation Number 28 of 2019 which contains recommendations on how many calories and nutrients in nutritional adequacy numbers are needed by each age group, the average daily calorie requirement for male aged 19 - 29 years is 2650 kcal and for female is 2250 kcal (Zakiyyah 2020).

The low level of sports participation indicates that people are not fully aware that they can achieve a healthy lifestyle through sports. The COVID-19 pandemic had forced people to carry out all forms of activities at home, both working and studying. Physical activity is an activity carried out by contracting muscles, triggering energy expenditure, and helping avoid various diseases (Kardi, et al, 2020). The occurrence of the Covid-19 pandemic had an impact on the reduced level of physical activity carried out, especially among students (Wungow, Berhimpong, and Telew 2021). Another opinion reveals that reduced levels of physical activi-

ty has a risk for obesity (Gupta et al. 2019). Obesity is a public health problem that requires special attention because it is the 5th leading cause of death in the world (Janah and Nugroho 2021).

During the pandemic, learning had been carried out online to protect students from COVID-19 transmission, which had caused a decrease in physical activity due to a long sitting time during online lectures (Utami et al. 2021). The results of the study revealed that, during the lockdown, the level of physical activity decreased significantly and sitting time increased (Jalal et al 2021). The results of other studies also showed that a decrease in physical activity due to physical distance, which limited leaving the house, caused a decrease in the physical activity level (Sibarani 2021). Various studies had revealed that, during the COVID-19 pandemic, people experienced changes in habits, including a lack of physical activity, resulting in increased body weight (Saragih, B. and Saragih F, 2020). Reinforced research revealed that, during the pandemic, the prevalence of lack of physical activity increased rapidly from 21.3% to 65.6% (Xiang, et al, 2020). Other findings revealed that the good physical activity level during online learning was only 7.5% (Ali, Sudirjo, and Rahman 2021). In addition, the results of other studies revealed that adolescents who did not carry out daily activities can have a lack of energy; therefore, if the energy intake is too much and not balanced with physical activity, the person is prone to obesity (Irawan et al. 2020). Another study revealed quantitatively that low physical activity level had a high risk of obesity and overweight (Ramanian, et al 2020).

Assessment of nutritional status is essential due to physiological changes and rapidly increasing growth rates, especially for students (Sibarani, 2021). Studies had revealed that an imbalance between physical activity and energy intake would lead to weight gain (Rukmana, Permatasari, and Emilia 2021). Therefore, it is necessary for the community to understand, especially students, to perform physical activities regularly to maintain physical fitness. In addition, exercise can increase the immune system, which can help a person fight off the COVID-19 virus. The role of regular exercise and physical activity to achieve physical fitness is important for quality of life during COVID-19 (Pinho, et al, 2020). Previous research had revealed that diet and physical activity behaviors should be positioned as

key objectives for interventions to promote better health outcomes (Quezada et al. 2017).

Students of the Faculty of Sport Sciences, Cenderawasih University, come from areas with different demographics, some from the mountains and some from the coast. During the COVID-19 pandemic, students studied online from their respective homes, so that daily calorie intake and physical activity levels after the COVID-19 pandemic need to be revealed and analyzed. This research is important to find out and map the level of daily calorie intake and physical activity of students to provide an overview of student body mass index and physical activity level before starting face-to-face or offline lectures. For this reason, this study aimed to determine and analyze the daily calorie intake and physical activity levels of students of the Faculty of Sports Science, Cenderawasih University, after the COVID-19 pandemic. It is hoped that this research can be used as a reference in mapping the daily calorie intake and physical activity levels of students, especially for regulating their daily calorie intake and physical activity levels.

## METHODS

This research was quantitative descriptive analytic research with a cross-sectional design. This study aimed to determine daily calorie needs of students related to their physical activity levels during the Covid-19 pandemic.

### Participants

Respondents of this study were students of the Sports Science Study Program, Cenderawasih University. The ages of the respondents ranged from 19-24 years, consisting of male and female students who actively attended lectures during the COVID-19 pandemic.

### Sampling Procedures

The population of this study included 558 FIK Cenderawasih University students. The sampling technique used was simple random sampling. The determination of the sample using the Slovin formula was performed to obtain the number of samples. The samples included 95 students, consisting of 60 males and 35 females.

## Materials and Apparatus

The physical activity level was measured using the International Physical Activity Questionnaire (IPAQ), which had been determined to be valid and reliable to measure the level of physical activity of Indonesians with a Kaiser–Meyer Olkin value of 0.910, Bartlett's test of sphericity value of  $X^2 = 573,434$  ( $df = 28$ ,  $p < 0.000$ ), and Cronbach's alpha value of 0.884 (Dharmansyah & Budiana, 2021). BMI was calculated by measuring weights and heights. Physical activity data were collected by distributing IPAQ questionnaires to the respondents. To calculate daily energy requirements, anthropometric measurements were carried out, namely body weight measurements using digital scales and height measurements using a stature meter.

## Procedures

Assessment of the respondent physical activity levels in the last 1 week was used to determine whether they were in the high, moderate, or low category. The categories for assessing the physical activity level are provided in Table 1.

**Table 1.** Physical characteristics of the subjects

Categories	Explanation
High	1. Perform heavy physical activity for 3 days with a MET value of 1500 min/week 2. Perform physical activity for 7 days with a minimum MET value of 3000 min/week
Moderate	1. Perform high-intensity activity for 3 days for at least 20 min/day 2. Perform moderate-intensity activity for 5 days for at least 30 min/day 3. Perform physical activity for 5 days with a total MET of 600 -1499 min/week
Low	1. Perform physical activity with MET value < 600 min/week

Daily calorie needs were calculated using the following steps and formulas (Hidayati 2015):

1. Determining nutritional status using BMI and fat percentage
2. Calculating Basal Metabolic Rate (BMR)
3. Calculating Specific Dynamic Action (SDA)
4. Calculating BMR + SDA
5. Calculating physical work activity  $\times$  (BMR + SDA)
6. Counting the number of calories to exercise in a day
7. Calculating daily total energy needs (no. 5 + no. 6)

## RESULT

The data obtained through the IPAQ, which was filled out online by 95 students, included anthropometric measurements of height and weight to determine the student daily calorie needs. The data were then processed using the SPSS application. After the data were collected, the data analysis process was carried out to determine the respondent ages and genders. The results of this data analysis are presented in Table 2.

**Table 2.** Characteristic of the Respondents

Gender	Frequency	(%)	Average	Average
Male	60	63.2	161	58.7
Female	35	36.8	155	51.2

  

Age	Frequency	(%)	Gender	(%)	Category
19	8	8.4	Male	8.3	Thin
20	16	16.8		70	Normal
21	10	10.5		21.7	Fat/Obesity
22	30	31.6	Female	22.9	Thin
23	17	17.9		62.9	Normal
24	14	14.7		14.3	Fat/Obesity
Total	95	100			

**Table 3.** Student Physical Activity Levels

Category	Frequency	Percentage (%)
High	45	47.4
Moderate	50	52.6
Low	0	0
Total	95	100

**Table 4.** Physical Activity of FIK students at Cenderawasih University

Day	Frequency	(%)	Average Day	Time (Minute)	Frequency	(%)	Average Time
1	0	0	3 Day	10–30	39	41.1	49 Minute
2	41	43.2		31–60	43	45.3	
3	27	28.4		61–90	8	8.4	
4	12	12.6		91–120	5	5.3	
5	15	15.8		121–150	0	0	
Total				Total	95	100	

  

Day	Frequency	(%)	Average Day	Time (Minute)	Frequency	(%)	Average Time
1	27	28.4	2 Day	10–30	53	55.8	40 Minute
2	32	33.7		31–60	35	36.8	
3	25	26.3		61–90	4	4.2	
4	11	11.6		91–120	3	3.2	
Total	95	100		Total	95	100	

  

Day	Frequency	(%)	Average Day	Time (Minute)	Frequency	(%)	Average Time
1	44	46.3	2 Day	10–30	10	10.5	61 Minute
2	28	29.5		31–60	50	52.7	
3	19	20.0		61–90	23	24.3	
4	4	4.2		91–120	29	30.5	
Total	95	100		Total	97	100	

  

Differences in Physical Activity Levels of Males and Females							
Males			Females			Average MET	
Category	Frequency	(%)	Category	Frequency	(%)	Male	Female
High	34	56.7	High	11	31.4	1943	1453
Moderate	26	43.7	Moderate	24	68.6		
Low	0	0	Low	0	0	High	Moderate
Total	60	100	Total	35	100		

Based on the results shown in Table 2, the age of the respondents ranged from 19 to 24 years. The respondent mean of age was 21.9 years; the mean of weight for males was 58.7 kg, and the mean of height was 161 cm; the mean of weight for females was 51.2 kg, and the mean of height was 155 cm. The respondents included 95 students, consisting of 60 males and 35 females. It showed that male gender was more dominant at FIK Cenderawasih University. There was a difference between the BMIs of males and females. In general, the mean of BMIs of the males and females were the same, in the normal category. However, in thin category, it included 22.9% of female students and only 8.3% of male students. In the obese category, male students tended to be dominant, namely at 21.7%, while female students were at 14.3%.

Based on data obtained from the respondents, the physical activity levels of FIK students at Cenderawasih University during the new normal period are shown in Table 3. Based on the results shown in Table 3, the physical activity level of FIK students at Cenderawasih University was primarily in the moderate category. The percentage of the moderate category was 52.6%, while the high category was 47.4%.

The results related to physical activity of FIK students at Cenderawasih University during the new normal period, such as the implementation of online learning correlated with high activity, moderate activity, and

**Table 5.** Overall Daily Calorie Intake/week & Average Calorie Needs of Males and Females

Averages Caloric Intake/week					Respondends
BMI	BMR	SDA	Calorie PA (kcal)	Calorie/day	
22.55	1441.6	144.16	963.92	3101	95
Average Calorie Needs of Males and Females					
Gender	Average				Results
Males	BMI				22.58
	BMR				1573
	SDA				157.3
	Calories for physical activity/day				131.25
	Total daily calorie intake/day				3363
Females	BMI				21.82
	BMR				1216.3
	SDA				121.63
	Calories for physical activity/day				114.22
	Total daily calorie intake/day				2389

low activity, are shown in Table 4. Based on the data shown in Table 4, high-intensity physical activity was primarily performed 2 days (43.2%) per week by the students, while the duration of high physical activity was primarily between 31 and 60 min (45.3%). However, on average, students performed high physical activity 3 days/week with an average duration of 49 min/day. Moderate physical activity was performed primarily for 2 days (33.7%) per week with a duration between 31-60 min (36.8%). Based on the data, on average, students performed moderate physical activity 2 days/week with an average duration of 40 min/day. Students who performed low-intensity physical activity performed it primarily for 1 day (46.3%) per week with a duration of 31-60 min (52.7%). Based on the data, on average, student did low physical activity 2 days/week with an average duration of 61 min/day.

The physical activity levels of FIK students at Cenderawasih University were different between males and females. Males primarily performed high-intensity physical activity with 1943 MET/week, while females primarily performed moderate physical activity with 1453 MET/week.

Based on the data analysis, the calorie needs of FIK University Cenderawasih students during the new normal period are shown in Table 5. Based on the results shown in Table 5, the average of student calorie need was 3101 calories/day for those with an average BMI of 22.55 (normal), the average BMR was 1441.6, the average SDA was 144.16, and the average calorie intake for physical activity were 963.92 kcal/day. The results show that there were differences between males

and females.

The average of male BMI was 22.58 (normal category), the average of male BMR was 1573 kcal/day, the average of male SDA was 157.3 kcal/day, the average of calorie need for physical activity was 131.25 kcal/day, and the average of daily calorie need for males was 3363 kcal/day. The average female BMI was 21.82 (normal category), the average of female BMR was 1216.3 kcal/day, the average of female SDA was 121.63 kcal/day, the average of calorie requirement for physical activity for females was 114.22 kcal, and the average of calorie need for females was 2389 kcal/day.

## DISCUSSION

This study shows that physical activity level has an impact on the student daily calorie needs and BMI. The more frequent and higher the physical activity carried out will have an impact on the student daily calorie needs and BMI. The results of previous studies had revealed a significant relationship between physical activity and BMI (Wijaya, Muliarta, and Permana 2020). Physical activity is a factor that affects nutritional status where reduced physical activity will cause an increase in BMI which can lead to obesity (Daniati 2020). However, the study found a lack of frequency and duration of physical activity. It might be due to the COVID-19 pandemic, which had required online learning because of the lockdowns. After the pandemic, to develop the awareness to do physical activity for all ages every day, we need support of all parties (Kardi, et al, 2020). This is because physical activity is the best alternative and a natural therapy to increase immunity against the

COVID-19 virus (Hita 2020). In addition, it was revealed that regular physical activity can increase muscle and bone strength (Hammami, et al, 2020).

The COVID-19 pandemic has a tremendous impact on every aspect of life, including in the field of education. The implementation of direct online learning has reduced the physical activity frequency because students have to sit down for lessons without having to go to their school. The findings in the field revealed that FIK Cenderawasih University students performed 2 days of high physical activity (43.2%) with an average duration of 49 min, moderate physical activity was also dominant at 2 days a week (33.7%) with an average duration of 40 min, and low activity was dominant at 1 day a week (46.3%) with an average duration of 61 min. The findings show that students met the WHO recommendation, which recommends 150 min of physical activity/week for moderate activity or 75 minutes/week for high-intensity physical activity (WHO 2020).

Based on the results of this study, the average daily calorie requirement of male students was 3363 kcal/day, and the average calorie requirement for female students was 2389 kcal/day. This is as stated that the calories needed by men are different from women even though they are in the same age range (Zakiyyah, 2021). These results are in line with the recommendation for energy intake by the government, which states that the energy adequacy rate for males aged 19–29 is recommended to be 2650 kcal/day and for females is 2250 kcal/day; one should pay attention to additional energy needs if active in physical activity, and in this case, energy needs could be higher than the recommendation (Kemenkes RI, 2020).

Based on these findings, FIK Cenderawasih University students were quite physically active in the new normal period. It was because during the new normal period, they were directed to keep exercising regularly at home and most students help their families with physical tasks. However, the results of a study in California revealed that during the COVID-19 pandemic, the level of physical activity decreased (Chaffee et al. 2021). It was further explained that the level of student physical activity decreased, lack of movement increased significantly, and students were not involved in sufficient physical activity during COVID-19 (Bertrand 2021). The results also showed that the COVID-19 had caused physical activity to drastically decrease with a

decrease in frequency for 35%, a decrease in duration for 34%, and a decrease in intensity for 42.7% (Lesser 2020).

Lack of physical activity causes a lot of energy to be stored as fat, so people who do not perform physical activity tend to be overweight or even obese. Of the FIK Cenderawasih University students, 67.4% had a normal BMI, 18.9% were fat, and 13.7% were thin. In males, 70% had a normal BMI, 21.7% were obese, and 8.3% were thin, while in females, 62.9% had a normal BMI, 14.3% were fat, and 22.9% were thin. It might be because most of the students live in mountainous, valley, and coastal areas, so while studying online, students continued to help their families work in the fields, such as gardening, farming, and catching fish. Therefore, most students continued to perform physical activities and spent energy, so they can maintain a normal BMI, even though physical activity had not been as routine as before the pandemic. The results of previous studies also revealed that both males and females experienced a significant decrease in anthropometric and physical performance during the COVID-19 pandemic (Alexander and Camic, 2020). As stated by (Haseler 2022), more physical activity is needed during the pandemic than before the pandemic to maintain immunity.

## CONCLUSION

Based on the results of the study, the physical activity level of FIK students at Cenderawasih University was in the high category for males and in the moderate category for females. It was in accordance with the student daily calorie needs where the average BMI of students was in the normal category. Therefore, the higher the physical activity, the higher the daily calorie needs, thus the BMI will be stable or normal.

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## CONFLICT OF INTEREST

The authors declared no conflict of interest.

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