



## How Many Calories Does Physical Activity Require for Physical Education College Students?

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### ABSTRACT

*The energy needs of each student vary depending on the type of activity of each because the task of students is not only to study but also as athletes, instructors, coaches, teachers or office workers. So that the energy needs of each student will be even if it is not known. Energy is the body's ability for physical activity. To be able to carry out physical activities optimally, sufficient energy is needed. This study aims to know early on the energy needs of students' physical activity. This research uses a quantitative descriptive method with a cross-sectional approach. Respondents in this research were 26 students, 18 men and 8 women, using the total sampling technique. This study uses a survey method. The instruments used in data collection were Body Mass Index (BMI), Basal Metabolic Rate (BMR), Specific Dynamic Action (SDA), Daily Activity Energy, and Exercise Energy. Data analysis uses percentages, max, min, and average values. The results of the study stated that the average BMI for the male sex was 11 respondents with the normal weight category and the average MBI for the female sex was 7 respondents with the normal weight category. So, student BMI in general is in the Normal Weight classification. While the average energy requirement for male students is 3217 cal/day, and the average energy requirement for female physical activity is 2466 cal/day, then the average activity carried out is study, practice and work. In conclusion, the energy requirements needed by male and female physical education students average 2985 cal/day, with the most frequent and average activities carried out being study and practice.*

**Keywords:** *College Student; Physical Activity; Energy.*

### INTRODUCTION

Activity is anything that can be done both physically and spiritually, which involves the anatomical system and requires energy (Westerterp, 2009). However, activity is closely related to a person's physique, so it can usually be called physical activity. Physical activity is any movement carried out by the body produced by skeletal muscles

and its movement requires energy, including activities carried out during work, play, household chores, travelling and recreational activities (WHO, 2022; Welis, W., & Rifki, M. S, 2013; Wiley, J., & Son., 2022). Another opinion says that physical activity is a bodily movement that increases energy expenditure in the body (Kemenkes. 2017; Kolokoltsev, M et al., 2022). All human movements that are carried out cannot be separated from the anatomical and physiological roles of the body, this will affect the changes in the systems that exist in the body. Like opinion (Saleh, 2019) said that if someone does a physical activity that involves muscles and requires energy, then the body will feel the effects of the activity being carried out.

If referring to this opinion that the types of activities carried out by students are different; some as students, as teachers, as trainers or instructors, and as workers. All activities carried out by students must certainly require sufficient energy to be able to complete these activities. Because in addition to the anatomical function as a support for the movement in carrying out activities, energy is no less important as a support in carrying out student activities. Energy is shown as the capacity to do one's work (Williams, M. H et al., 2017). To improve one's physical quality, of course, it can be improved through efficiency in muscle fitness and energy fitness, this can be caused by motion which is the embodiment of muscle contraction, whereas to get muscle contraction requires sufficient energy. The energy used to carry out activities is obtained from the metabolism of food consumed daily by the body. In the body, two types of energy work namely; chemical energy in the form of food metabolism and mechanical energy of muscle contraction to perform motion. Food consumed daily can be broken down into small particles in the digestive tract to be absorbed and transported to the cells in the body. In the body, several energy metabolism systems can provide energy as needed when resting or during activity (Sharkey, 1990)

Therefore we can say that nutrition is one of the determinants of the quality of one's physical performance and growth (Gibney, M.J., 2022). Energy is very important to pay attention to in carrying out physical activities because if fatigue occurs it is the result of insufficient availability of energy in the body which is needed when carrying out activities. When viewed from the type of activity, the energy needs of each student are also different. For students whose activities are athletes, their energy needs are different from students who work in offices, become teachers, become coaches or instructors, and even those who only go to college every day (Crowley, J, 2019). However, each person's energy needs are also determined by differences in male or female age, height, weight,

and energy reserves in the body (Saputro & Fidayani, 2020). Therefore energy needs must be known in advance before students carry out activities as students, athletes, trainers/instructors and teachers so that the energy they have is following the activities carried out.

## METHOD

This study used a quantitative descriptive method with a cross-sectional approach because the research was conducted only to describe a situation that existed. said this method provides a quantitative description of trends, attitudes, and circumstances, and tests the population to study or reveal realistically about situations and conditions (Creswell & Creswell, 2018; Sugiyono, 2017; Igwanagu, 2016; Budiwanti, 2017). Research like this helps researchers to answer three questions, one of which is a descriptive statement about percentages. This study uses a survey test.

The Participants in the Physical education study program, Faculty of Teaching and Education, Muhammadiyah University of Sukabumi approved this research. This study involved physical education students to become research subjects. In principle, researchers inform students about the analysis of energy needs every day. A total of 26 subjects were in this study. research subjects consisted of 18 men and 8 women. The researcher informs the students to collect data on age, height, weight, and activities carried out. This research was conducted in building A10.

Data processing used in this study was Body Mass Index (BMI), used to calculate nutritional status with the formula  $BMI = BB(kg)/TB(m)^2$ ; Basal Metabolic Rate (BMR) is used to calculate the minimum energy needed by the body in a state of complete rest both physically and mentally, lying down or sleeping in a room with a temperature of 25oC; Specific Dynamic Action (SDA) is used to calculate the amount of energy needed for the process of food metabolism with the formula  $SDA = BMR \times 10\%$ ; Daily Activity Energy is used to determine daily physical activity, namely daily routine activities, including sports activities with the Act Energy formula.  $Physical = Active\ Factor. Physical \times (BMR+SDA)$ ; and energy training (Irianto, 2007). Data analysis using the percentage formula  $Percent\ (\%) = (number\ of\ parts) / (total\ number) \times 100\%$ , Highest, lowest and average value.

## RESULTS AND DISCUSSION

### Results

Based on the research that has been carried out, anthropometric data and the energy needs of students' physical activity are obtained. In general, student activity is learning because the main goal is to study, then later as athletes, both local, national and international athletes. Apart from that, students also act as trainers, instructors, and office workers.

To find out the energy needs of students' physical activity in one day, data or calculations of Body Mass Index (BMI) are needed, so the results of this study were obtained based on calculating data from a sample of 26 people using Body Mass Index (BMI), with the formula  $BB \text{ (kg)} / TB \text{ (m}^2) = \text{BMI}$ .

**Table 1.**  
*Body Mass Index (BMI) for Men*

Respondent	BMI	Category
Respondent 1	18,51	Under Weight
Respondent 2	24,80	Over Weight
Respondent 3	21,39	Normal Weight
Respondent 4	17,14	Under Weight
Respondent 5	24,52	Over Weight
Respondent 6	18,81	Normal Weight
Respondent 7	22,85	Normal Weight
Respondent 8	24,12	Over Weight
Respondent 9	20,33	Normal Weight
Respondent 10	24,05	Normal Weight
Respondent 11	17,05	Under Weight
Respondent 12	20,43	Normal Weight
Respondent 13	24,91	Over Weight
Respondent 14	21,00	Normal Weight
Respondent 15	22,03	Normal Weight
Respondent 16	24,07	Normal Weight
Respondent 17	22,33	Normal Weight
Respondent 18	20,20	Normal Weight

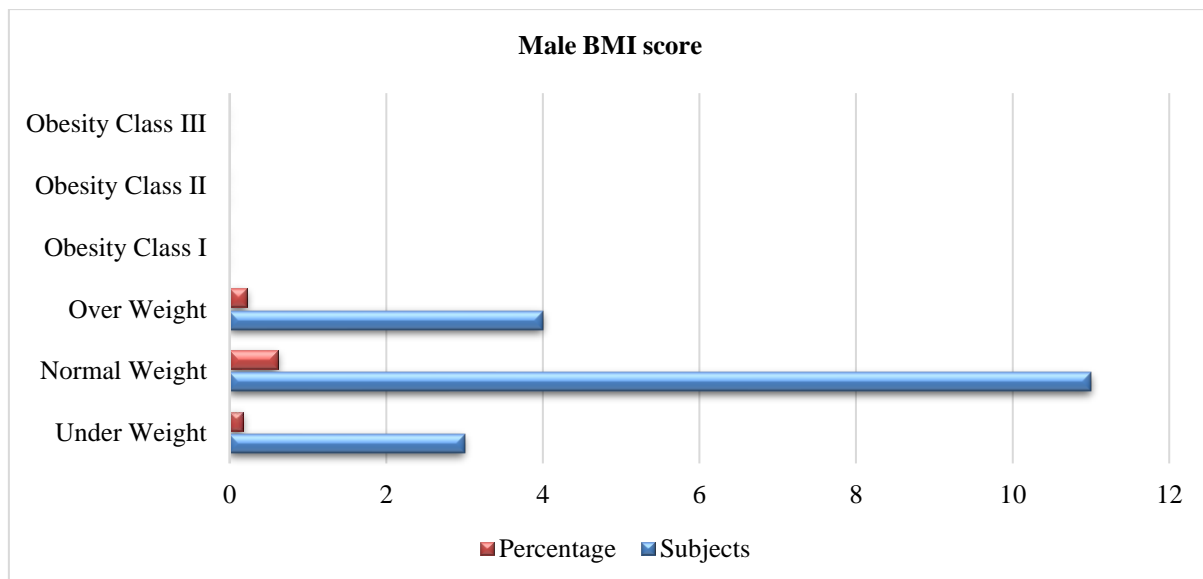
**Table 2.**  
*Body Mass Index (BMI) for women*

Respondent	BMI	Category
Respondent 1	23,33	Normal Weight
Respondent 2	20,47	Normal Weight
Respondent 3	20,02	Normal Weight
Respondent 4	23,93	Normal Weight
Respondent 5	18,00	Under Weight
Respondent 6	21,01	Normal Weight
Respondent 7	19,78	Normal Weight
Respondent 8	22,52	Normal Weight

From the results of this study, the lowest score for men was 17.5 and the highest score was 24.91, with a percentage of 3 people or 17% in the Under Weight category, 11 people or 61% in the Normal Weight category, and 4 people in the Over Weight category. or 22%. Then the lowest score for women was 19.78 and the highest score was 23.93, with a percentage of underweight category 1 person or 13% and normal weight category 7 people or 88%. Thus in general the Body Mass Index (BMI) of students is in the Normal Weight category, for details can be seen in the following table:

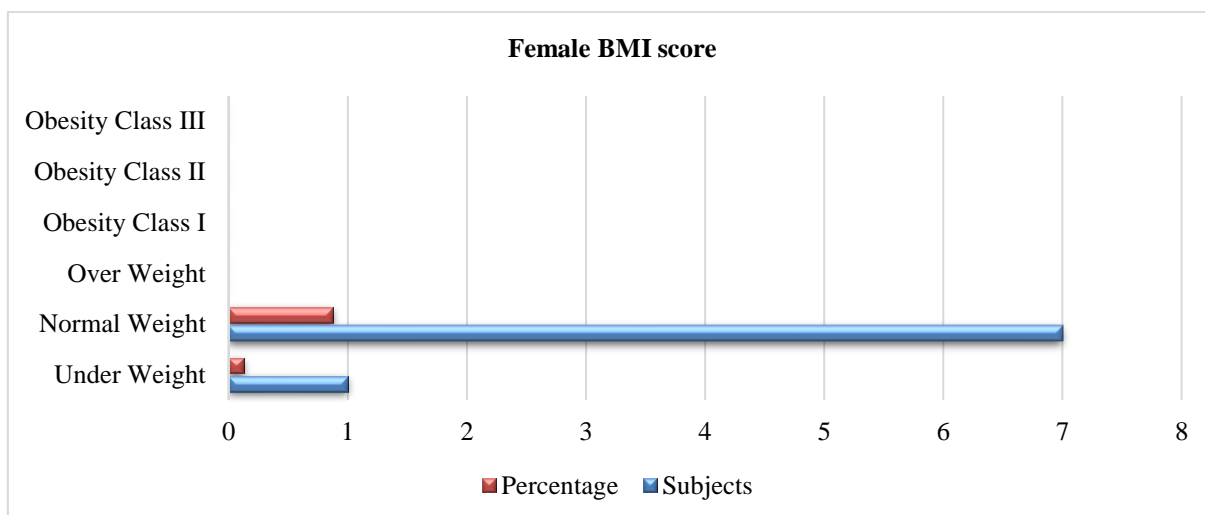
**Table 3.**  
 Percentage of Body Mass Index (BMI)

Classification	QTY	Percentage	QTY	Percentage
	Male		Women	
Under Weight	3	17%	1	13%
Normal Weight	11	61%	7	88%
Over Weight	4	22%	0	0%
Obesity Class I	0	0%	0	0%
Obesity Class II	0	0%	0	0%
Obesity Class III	0	0%	0	0%
<b>Amount</b>	<b>18</b>	<b>100%</b>	<b>8</b>	<b>100%</b>



**Figure 1.**  
 Male BMI score

From Figure 1. BMI percentage in male subjects is generally in the normal category, as evidenced by 61%/11 subjects out of 100%/18 subjects.



**Figure 2.**  
Female BMI score

From Figure 2. BMI percentage in female subjects is generally in the normal category, as evidenced by 88%/7 subjects out of 100%/8 subjects.

In addition to calculating Body Mass Index (BMI), data for calculating Basal Metabolic Rate (BMR), Specific Dynamic Action (SDA), Daily Activity Energy, and Exercise Energy are also needed using the Act Factor formula.  $Physical \times (BMR + SDA)$ . From the data obtained through these calculations, the results are obtained as follows:

**Table 4.**  
List of energy needs for male physical activity

Respondent	BMI	BMR	SDA	Physical Activity Energy	Energy Workout/Week	Total needs
Respondent 1	18.51	1589	158,9	2796	328	3324
Respondent 2	24.80	1664	166,4	2364	365	3625
Respondent 3	21.39	1845	184,5	2265	216	3674
Respondent 4	17.14	1514	151,4	5147	300	3351
Respondent 5	24.52	1664	166,4	3111	240	3265
Respondent 6	18,81	1589	158,9	2971	311	3382
Respondent 7	22.85	1739	173,9	3251	154	3662
Respondent 8	24.12	1945	194,5	2381	238	3417
Respondent 9	20,33	1589	158,9	1859	377	2236
Respondent 10	24,05	1589	158,9	2701	351	3051
Respondent 11	17,05	2359	235,9	4150	393	2594
Respondent 12	20,43	1589	158,9	2971	154	3125
Respondent 13	24,91	1739	173,9	3060	434	3625
Respondent 14	21,0	1589	158,9	3146	514	3660
Respondent 15	22.03	1421	142,1	3021	329	2422
Respondent 16	24.07	1514	151,4	2664	509	3173
Respondent 17	22.33	1381	138,1	1440	205	3351
Respondent 18	20.20	1514	151,4	2511	237	2968



**Table 5.**  
 List of energy needs for women's physical activity

Respondent	BMI	BMR	SDA	Physical Activity Energy	Energy Workout/Week	Total needs
Respondent 1	23,33	1296	129,6	2280	189	2463
Respondent 2	20,47	1296	129,6	2280	514	2794
Respondent 3	20,02	1223	122,3	2152	295	2337
Respondent 4	23,93	1296	129,6	2280	480	2588
Respondent 5	18,00	1149	114,9	2022	111	2133
Respondent 6	21,01	1223	122,3	2152	411	2563
Respondent 7	19,78	1223	122,3	2152	137	2289
Respondent 8	22.52	1223	122,3	2152	214	2562

Based on the table above, for men, the average BRM is 1657, and the average SDA is 165.7. Furthermore, the lowest energy requirement is 2236, and the highest energy requirement is 3673. So, the average energy requirement for men is 3674 energy/cal. Whereas for women, the average BRM is 1241 and the average natural resource is 124.1. Furthermore, the lowest energy requirement is 2133 and the highest energy requirement is 2794. So, the average energy requirement for male students is 2466.1 energy/cal.

## Discussion

Based on the results of the study that to see the energy needs used during physical activity whether as students, athletes, trainers, instructors, teachers or office workers, can be analyzed first the Body Mass Index (BMI) level, in BMI there are several categories including Under Weight, Normal Weight, Over Weight, Obesity Class I, Obesity Class II, Obesity Class III (WHO, 2022). When viewed from the results of the study, respondents were in the normal weight category with 69%, this shows that students can manage eating patterns and carry out physical activities. The higher the physical activity, the better a person's mental condition (Canli & Samar, 2022). A good mentality, of course, also affects one's physical performance. If one has a good mentality, one's physical performance will also increase, so one can do physical activity and avoid being overweight. However, being overweight occurs not only because of a lack of physical activity but also many other factors including healthy lifestyle habits, eating patterns, physical activity and sleep patterns that are applied to children and will trigger several disease problems, physical problems, psychological and social problems in children (MB, 2010).

If seen from several studies each person requires a different amount of energy, depending on body weight, age, gender, activities carried out, and environmental conditions. Carbohydrate Requirements For heavy workers, including athletes who do

strenuous exercise, the need for carbohydrates can reach 9-10 gr/KgBB/day, or approximately 70% of the total energy requirement each day and should contain complex carbohydrates, other reasons they contain high energy, also contain other nutrients The need for fat to maintain the balance of its functions, the body requires fat 0.5 to 1 gr/KgBB/day (James, W.P.T, et all, 1989 & Widdowson, 1983). Exercise training increases the capacity of the muscles to use fat as an energy source. However, energy consumption from fat is recommended to be no more than 30% of total energy per day. Protein needs in general, protein needs are 0.8 to 1.0 gram/KgBB/day, but for those who work hard, protein needs increase. This amount of protein can be obtained from a diet that contains 12-15% protein. Vitamin and mineral needs Vitamin and mineral needs will increase in line with the level of activity. Vitamin needs vary depending on function, for example, the need for vitamin E is 15 IU or the equivalent of 10 mg/person/day. Need for water to maintain hydration status, each person needs an average of 2500 ml per day. This amount is equivalent to the fluid released by the body in the form of sweat, moisture or liquid that comes out with the stool (Irianto, 2007).

Then the physical activity of students also varies, and can be divided into three levels

- 1) Light activity, namely students only expend a little energy and usually do not change breathing. Light activities that are usually carried out by students are studying in the room or theoretical lessons, tutoring in the laboratory, e-sports and hanging out and other similar activities.
- 2) Moderate activity, this activity requires continuous and rhythmic intense energy, students usually do instructor activities, jog, fast walk, play music and others.
- 3) strenuous activities are activities that require strength and endurance, in these activities, students usually carry out training camps, martial arts, aerobics and others (Burhaein & Saleh, 2017)

The BMI condition of students in higher education can be said to be good because the BMI is in the normal category, this shows that students have implemented a healthy lifestyle in the form of always doing physical activity and managing their diet. This condition can be seen that student activity is seen when after learning they carry out other activities either in the form of practising or teaching. But in general student activities are learning and practicing. Apart from being seen from the physical activity carried out, the energy needs are also sufficient to be able to carry out subsequent activities. Based on the results of the study, the average energy requirement for physical activity in one day is 2986 energy/cal. So that this energy is enough to support the activities it does.



## CONCLUSIONS

Based on the results of the research that has been discussed, we can conclude that the Body Mass Index (BMI) for the male sex is 11 respondents with the normal weight category and the average MBI for the female sex is 7 respondents with the normal weight category. So, student BMI in general is in the Normal Weight classification. While the average energy requirement for male students is 3217 cal/day, and the average energy requirement for female physical activity is 2466 cal/day, then the average activity carried out is study, practice and work. This can happen because each individual has their activities and activities.

## Suggestions

The hope is that every student can know in advance the energy requirements used every day because someone needs the energy to be able to carry out maximum physical activity.

## REFERENCES

- Blair, Steven N.; Horton, Edward; Leon, Arthur S.; Lee, I-Min; Drinkwater, Barbara L.; Dishman, Rod K.; Mackey, Maureen; Kienholz, Michelle L.. Physical activity, nutrition, and chronic disease. *Medicine & Science in Sports & Exercise* 28(3):p 335-349, March 1996.
- Budiwanto, S. (2017). *Metodologo Penelitian dalam Keolahragaan*. UM penerbot & Percetakan.
- Burhaein, E., & Saleh, M. (2017). Optimalisasi Pengaturan Gizi Dan Aktivitas Olahraga Untuk Mengatasi Obesitas Anak Tunagrahita. *Seminar Nasional Gizi*, 11–21.
- Canli, U., & Samar, E. (2022). Exploring the effect of physical activity level on balance, aerobic performance and cognitive function in young sedentary individuals. *Journal of Physical Education and Sport*, 22(10), 2504–2512. <https://doi.org/10.7752/jpes.2022.10318>
- Creswell, J. W., & Creswell, J. D. (2018). Research Design Qualitative, Quantitative, and Mixed Methods Approaches. In *SAGE Publications*.
- Crowley, J., Ball, L., & Hiddink, G. J. (2019). Nutrition in medical education: a systematic review. *The Lancet Planetary Health*, 3(9), e379–e389. doi:10.1016/s2542-5196(19)30171-8
- Gibney, M.J., Forde, C.G. Nutrition research challenges for processed food and health. *Nat Food* 3, 104–109 (2022). <https://doi.org/10.1038/s43016-021-00457-9>
- Igwenagu, C. (2016). Fundamentals of research methodology and data collection: Enugu State University of Science and Technology.
- Irianto, D. P. (2007). *Panduan Gizi Lengkap Keluarga dan Olahragawan*. CV. Andi Offset.

- James, W.P.T., Ralph, A., Ferro-Luzzi, A. (1989). Energy Needs of the Elderly. In: Munro, H.N., Danford, D.E. (eds) Nutrition, Aging, and the Elderly. Human Nutrition, vol 6. Springer, Boston, MA. [https://doi.org/10.1007/978-1-4899-2537-4\\_6](https://doi.org/10.1007/978-1-4899-2537-4_6)
- Kemenkes. (2017). Ayo Bergerak Lawan Obesitas. In *Kementrian Kesehatan Republik Indonesia* (p. 37). <http://p2ptm.kemkes.go.id>
- Kolokoltsev, M., Ambartsumyan, R., Romanova, E., Vorozheikin, A., Torchinsky, N., Dudchenko, P., & Tarasov, A. (2022). Physical activity characteristics of female students with various diseases. *Journal of Physical Education and Sport*, 22(2), 455–461. <https://doi.org/10.7752/jpes.2022.02057>
- MB, A. (2010). *Buku Ajar Ilmu Gizi: Gizi dalam daur kehidupan* (2nd ed.). EGC.
- Mitchell, J. H., Haskell, W. L., & Raven, P. B. (1994). Classification of sports. *Journal of the American College of Cardiology*, 24(4), 864–866. [https://doi.org/10.1016/0735-1097\(94\)90841-9](https://doi.org/10.1016/0735-1097(94)90841-9)
- Saleh, M. (2019). Latihan dan aktivitas fisik untuk meningkatkan kesejahteraan psikologis. *Journal Power Of Sports*, 12–22(9), 1689–1699. <http://e-journal.unipma.ac.id/index.php/JPOS/article/View/4005>
- Saputro, W. A., & Fidayani, Y. (2020). Analisis Faktor-Faktor Yang Mempengaruhi Angka Kecukupan Energi Rumah Tangga Petani Di Kabupaten Klaten. *Vigor: Jurnal Ilmu Pertanian Tropika Dan Subtropika*, 5(2), 51–55. <https://doi.org/10.31002/vigor.v5i2.3039>
- Sharkey, B. J. (1990). Fitness and health: Fourth Edition. In *Human Kinetics*.
- Sugiyono. (2017). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung : Alfabeta, CV.
- Welis, W., & Rifki, M. S. (2013). Gizi untuk Aktifitas Fisik dan Kebugaran. In *Sukabina Press*
- Westerterp, K.R. Assessment of physical activity: a critical appraisal. *Eur J Appl Physiol* 105, 823–828 (2009). <https://doi.org/10.1007/s00421-009-1000-2>
- WHO. (2022). *Physical activity*. October, 1–9.
- Widdowson, EM (1983). Berapa Banyak Makanan yang Dibutuhkan Manusia? Evaluasi Kebutuhan Energi Manusia. Dalam: Mauron, J. (eds) Kecukupan Gizi, Ketersediaan dan Kebutuhan Gizi. *Experientia Supplementum*, vol 44. Birkhäuser, Basel. [https://doi.org/10.1007/978-3-0348-6540-1\\_2](https://doi.org/10.1007/978-3-0348-6540-1_2)
- Wiley, J., & Son. (2022). Sport and Exercise Nutrition. In *Nucl. Phys.* (Vol. 13, Issue 1). Wiley-Blackwell is.
- Williams, M. H., Rawson, E. S., & Branch, J. D. (2017). Nutrition for Health, Fitness, & Sport. In *McGraw-Hill Education*.