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Syamsul Gultom 
Universitas Negeri Medan, Indonesia

Baharuddin 
Universitas Negeri Medan, Indonesia

Dina Ampera 
Universitas Negeri Medan, Indonesia

Hesti Fibriasari 
Universitas Negeri Medan, Indonesia

Nurpelita Sembiring 
Universitas Negeri Islam Sultan Syarif Kasim Riau, Indonesia

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Profile of Student Physical Fitness Level of Sports Science Study Program: Relationship between Nutrition Status and Learning Achievement during COVID-19 Pandemic

Syamsul Gultom, Baharuddin, Dina Ampera, Hesti Fibriasari, Nurpelita Sembiring

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Abstract

The level of physical fitness during the coronavirus pandemic has become a basic need because exercise can increase immunity and improve physical fitness. Lack of physical activity during a pandemic can increase the risk of disease and obesity. So that the nutritional status increases while it is not accompanied by physical activity in sports students. This study aims to determine the level of physical fitness in terms of its relationship with nutritional status and learning achievement of students of the Sports Science Study Program at the State University of Medan. This research is a correlational study to find the relationship between two or more variables. This study has two independent variables, namely physical fitness and nutritional status, and one dependent variable, namely learning achievement in practical courses. The participants in this study were students following the Physical Fitness training course, amounting to 42 students. The results in this study indicate that there is no significant relationship between nutritional status and student achievement. There is a significant relationship between physical fitness and student achievement. There is a significant relationship between nutritional status and physical fitness with student achievement. Physical fitness contributed to student learning achievement by providing an effective contribution of 39%, while nutritional status was 72.53%.

Introduction

The physical distancing policy is an effort to break the chain of the spread of COVID-19, which impacts the pattern of limiting human activities in various sectors of life, one of which is in the field of education. Especially at the tertiary level, students no longer come to campus to carry out practical lectures in sports but are replaced with online learning via video conferencing. Students are usually active in sports activities on campus through practical lectures and lose practical lectures or sports training sessions with online lectures from home. During the lecture process, the majority of students use video conferencing facilities to connect lecturers and students.

The online education increased the frequency of students' habits in operating smartphones for a long time to listen to the lecture process and do lecture assignments. This problem was obtained based on preliminary research conducted by Andriana and Ashadi (2019), who surveyed 19 students of the S1 Sports Science study program from the Faculty of Sports Science, Medan State University. The facts show that, on average, these students conduct video conferences with course lecturers for 3-4 hours per day. While undergoing physical distancing at home, these students fill their time playing with smartphones while sitting or lying on the bed for 5 hours a day (Panda, 2020; Tukul, 2020 ; Wong, 2020).

If this is not addressed immediately, it is at risk of causing students to experience a lack of movement. In addition, with limited access to leave the house, it tends to make students stay indoors for a long time, so it is at risk for students to experience a sedentary lifestyle and hurt themselves (Kehler & Theou, 2019). Lack of movement can hurt a person's health because lack of movement is a risk factor for cardiovascular disease (Mainous et al., 2019). Several studies say that lack of movement can reduce immunity (Atilgan, & Tukul, 2021 ; Luzi & Radaelli, 2020). When students carry out their daily activities, they need sufficient energy, where this energy will be used by the body to carry out endurance, flexibility, coordination, and agility. Lack of nutritional intake makes students' nutritional status worse, so they will have enough energy to carry out activities in their daily lives. The nutritional status of sports students can affect the level of physical fitness of the students themselves.

Excess nutritional intake in adolescence will have a book impact because, at this time, there will be very rapid changes in growth and development. So that balanced nutrition and good fitness are needed to support optimal growth and development. Movement activities carried out by sports students will affect their physical condition; however, the environment is also very influential on all student activities. If a person has physical fitness and nutritional status that is not balanced, development and growth disorders can occur because every time a student makes a motion requires energy.

During the COVID-19 pandemic, students had good food intake, balanced and sufficient nutritional value, while moving activities were lacking because they had to stay at home. In sports activities, a person's motion will be the center of attention. Therefore, a good motion must be supported by sufficient energy, sufficient normal physiological functions, and good health. By staying at home, students can control their nutritional status and maintain good physical fitness. Students who stay at home can control their diet because they eat according to the amount of energy expended every day without ignoring the main nutritional components needed by the body, namely a menu that is by the concept of four healthy five perfect.

Good physical fitness is expected to support student learning achievements, especially in sports where students are engaged. One factor that supports student physical fitness is the fulfillment of nutritional status because adequate nutrition will increase fitness so that student achievement is also expected to increase. A good level of physical fitness will lead to good physical abilities as well. Students who are always active will have good physical fitness so that learning outcomes will be better. Nevertheless, good nutrition and supported by good fitness, not accompanied by body movement, makes students feel lazy to move.

During this pandemic, the use of the internet has become commonplace for students. They sit for hours, spending time in front of computers and smartphones. This behavior tends to lead to a lack of exercise and adequate sleep duration, especially for students. Besides that, the food consumed is not given much attention because it is too focused and fun to play games so that the intake of nutrients that enter is reduced. Sports students who do not exercise daily cause their bodies to expend less energy coupled with less nutritional intake so that a student will become more vulnerable to nutritional problems. Based on the above background, the following problems can be identified:

- (1) The nutritional status of students who stay at home alone during the pandemic is unknown.
- (2) The limited knowledge of students about the importance of eating nutritious food to support learning activities in higher education.
- (3) There is no known relationship between nutritional status and physical fitness level with students' learning achievement who only stay at home. Seeing this situation, researchers are interested in knowing the physical fitness and nutritional status of students who stay at home during the pandemic.

Student Nutrition Status

Every human being needs nutrient intake to meet their survival. Proper nutrition results in the fulfillment of nutrients so that they can fight the COVID-19 virus. Prevention of the spread of COVID-19 by building body immunity (Srivastav et al., 2020) is carried out with proper nutritional intake in the form of vegetables containing minerals, vitamins, and bioactive compounds contained (Burnet et al., 2020). According to the Ministry of Health (2020), the guidelines state maintaining the consumption of balanced nutritious foods, limiting salt and fat, consuming supplements and multivitamins if needed, avoiding cigarettes and alcoholic beverages.

The imbalance between intake and nutritional adequacy will cause nutritional problems, both in the form of overnutrition and undernutrition. Nutritional problems in adolescents will hurt public health, for example, a decrease in learning concentration and a decrease in physical fitness. Nutritional status can be determined through laboratory examination or anthropometry. Anthropometry is the easiest and cheapest way to determine nutritional status.

Body Mass Index (BMI) is recommended as a good indicator to determine the nutritional status of adolescents. Body Mass Index is also a simple tool to monitor the nutritional status of adults, especially those related to underweight and overweight (Tunç & Akandere, 2020). Nutritional status is a condition of a person due to consuming and processing food in the body and the suitability of the nutrients consumed with the nutrients needed by the body. Good nutritional status is needed to maintain a degree of fitness and health, help growth for a person, and support the development of athlete achievement.

Assessment of nutritional status can be done by looking at Figure 1.

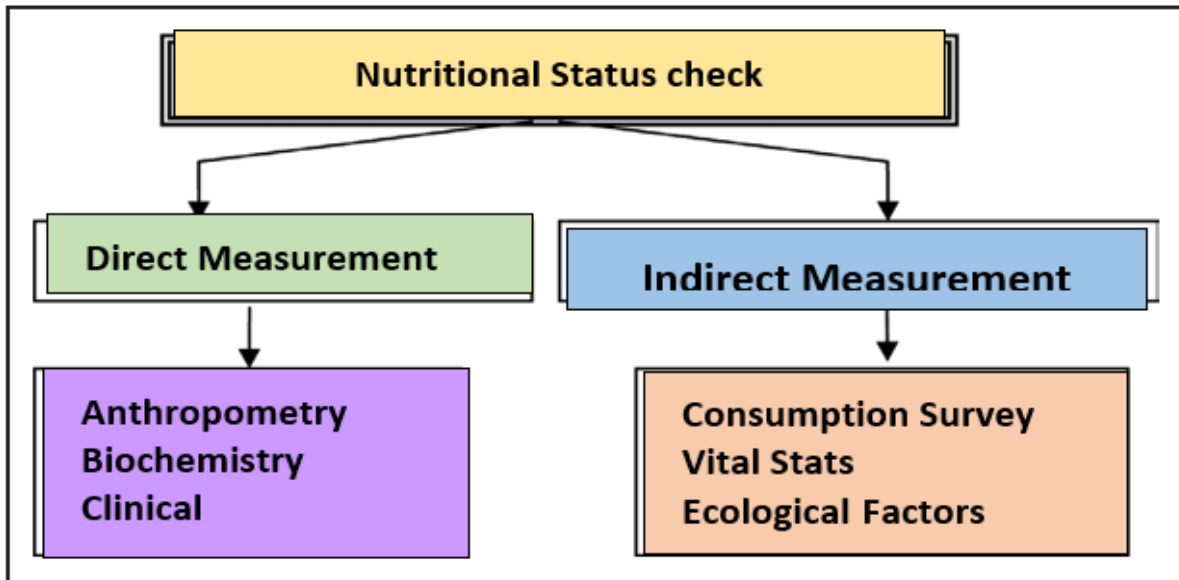


Figure 1. Nutritional Status Assessment Method (Source: Knox et al., 2003)

Nutritional status is an expression of a state of balance in the form of certain variables, or it can be said that nutritional status is an indicator of whether or not the daily food supply is good. According to Almatier (2011), nutritional status is a sign or appearance caused by a balance between nutritional intake and energy expenditure which is seen through indicators of weight and height. Assessment of nutritional status is a process of examining a person's nutritional status by collecting important data, both objective and subjective.

Physical Fitness

According to Lutan (2001), physical fitness related to health is a person's ability to perform physical tasks that require endurance and flexibility. Meanwhile, according to Knox et al. (2003), in general, physical fitness is a person's ability to do daily work efficiently without excessive fatigue so that he can enjoy free time. Sumarjo (2002) argues that physical fitness is the ability to easily complete daily tasks without significant fatigue, enjoy their free time, and do incredible work in an emergency. From the explanation above, it can be concluded that physical fitness is a condition in which a person can complete his daily tasks well without any significant fatigue.

Knowing and understanding physical fitness is very important because the components of physical fitness are a determinant of good or bad physical conditions or a person's level of physical fitness. According to Lutan (2001), physical fitness includes two aspects: fitness related to health and physical fitness related to performance:

- Health-related fitness contains four main elements, namely:
 - (a) muscle strength and muscle endurance,
 - (b) aerobic endurance,
 - (c) flexibility, and
 - (d) body composition.

- Physical fitness related to performance contains the following elements:
 - (a) coordination,
 - (b) agility,
 - (c) speed of movement,
 - (d) power, and
 - (e) balance.

According to Knox et al. (2003), the components of physical fitness are grouped into four parts. First, cardio-respiratory endurance is the ability of the heart, lungs, and blood vessels to function properly when carrying out daily activities for a long time without experiencing significant fatigue. Second, cardiopulmonary endurance is very important to support muscle work by taking oxygen and distributing it to active muscles. Third, muscle endurance and muscle strength; Muscular endurance is the ability of muscles to perform a series of work in a long time. Muscular strength is the ability of muscles to resist loads in an effort. Fourth, flexibility is the ability of joints to move against the load in an effort. Fifth, body composition is the ratio of body weight in fat in the form of the lean body expressed as a percentage of the body.

Body composition includes two things, namely Body Mass Index (BMI) and body fat percentage. BMI is a way to describe weight about height and predict nutritional status, namely obesity. Fat percentage is the ratio between body fat and body weight obtained through a certain formula based on the measurement of fat thickness using a skinfold caliper.

A healthy body is the result of the interaction of various factors that affect the body's condition, either directly or indirectly. According to Knox et al. (2003), physical fitness is classified into three groups, namely static fitness, dynamic fitness, and motor fitness:

Static Fitness: The state of a person who is free from disease and disability or is called healthy.

Dynamic fitness: A person can work efficiently that does not require special skills, such as walking, running, jumping, and lifting.

Motor fitness: A person's ability to work efficiently requires special skills. To find out and assess a person's level of physical fitness can be done with the Cooper test by running or walking for 12 minutes.

Achievement is the result that a person has achieved in carrying out activities. Learning achievement is divided into five aspects: intellectual abilities, cognitive strategies, verbal information, attitudes, and skills. According to Bloom in Arikunto (2016), learning outcomes are divided into three aspects, namely cognitive, affective, and psychomotor. Achievement is a concrete skill or result that can be achieved at a certain time or period. Muray in Beck (1990) and Camera (2016) defines achievement as follows: "to overcome obstacles, to exercise power, to strive to do something difficult as well and as quickly as possible" It means, "the need for achievement is overcoming obstacles, exercising strength, trying to do something difficult as well and as quickly as possible." based on this opinion, the achievements in this study are the results that students in the learning process have achieved.

Method

This research is a correlational study to find the relationship between two or more variables. In this study, there are two independent variables: nutritional status and physical fitness, and one dependent variable, namely the learning outcomes of practical courses. The population is the entire research subject (Arikunto, 2016). The population in this study was students amounting to 120 people. The sampling technique used in this research is purposive sampling. The sample used in this study was 42 students of the Sports Science Study Program (IKOR) of the Faculty of Sports, State University of Medan.

The instruments used in data collection for each variable are:

- (1) *Nutritional status* is a way of assessing nutritional status based on anthropometric measurements, including BMI: Koup Devenport using a nutritional status assessment method by calculating BMI or Body Mass Index (BMI) (Knox et al., 2003).
- (2) *Physical fitness level* is the level of physical fitness measured using a 12-minute running and walking test (cardiopulmonary endurance test using the Cooper method).
- (3) *Learning achievement* is measured by using the instrument used to determine student learning achievement who stays at home using the first semester (odd) study results list (DHS).

Based on the first semester of DHS, the success of students studying for one semester will be known. Running tests have been prepared for elementary school, high school, college students, and adults in measuring physical fitness. The fitness criteria can be seen in Table 1.

Table 1. A Person's Fitness Criteria based on Distance in the Cooper Test (source: Pans et al., 2021)

Gender/Age	Very good	Above average	Average	Below average	bad
Boy 13-14	>2700m	2400-2700m	2200-2399m	2100-2199m	<2100m
Girl 13-14	>2000m	1900-2000m	1600-1899m	1500-1599m	<1500m
Male 15-16	>2800m	2500-2800m	2300-2499m	2200-2299m	<2200m
Girl 15-16	>2100m	2000-2100m	1700-1999m	1600-1699m	<1600m
Boy 17-18	>3000m	2700-3000m	2500-2699m	2300-2499m	<2300m
Girl 17-20	>2300m	2100-2300m	1800-2099m	1700-1799m	<1700m
Male 20-29	>2800m	2400-2800m	2200-2399m	1600-2199m	<1600m
Female 20-29	>2700m	2200-2700m	1800-2199m	1500-1799m	<1500m
Male 30-39	>2700m	2300-2700m	1900-2299m	1500-1999m	<1500m
Female 30-39	>2500m	2000-2500m	1700-1999m	1400-1699m	<1400m
Male 40-49	>2500m	2100-2500m	1700-2099m	1400-1699m	<1400m
Female 40-49	>2300m	1900-2300m	1500-1899m	1200-1499m	<1200m
Male >50	>2400m	2000-2400m	1600-1999m	1300-1599m	<1300m
Girl >50	>2200m	1700-2200m	1400-1699m	1100-1399m	<1100 m

Results and Discussion

This research was conducted on students of the Sports Science Study Program (IKOR) Faculty of Sports

Science, Universitas Negeri Medan, with a sample of 42 students. Data collection was carried out in June 2020. The data in this study were obtained by testing and documentation. The dependent variables in this study, for the independent variable, are namely nutritional status, student learning achievement, and physical fitness during the COVID-19 pandemic. Univariate Analysis of Nutritional Status Distribution of respondents' nutritional status can be classified as follows.

Table 2 shows that most IKOR students are in the good nutritional status category, namely 42 respondents (71.42%). The BMI index measured nutritional status in this study, namely body weight in kilograms (kg) divided by height in meters squared (m²). The data analysis results obtained the lowest value = 17.26, and the highest was 24.73, with the following central tendency figures: the mean (mean) of 20.82; median= 20.66; mode= 22.15; and standard deviation of = 1.610.

Table 2. Distribution of Nutritional Status in Students

Nutritional Status	Frequency	Percentage (%)
Not good	12	28.58
Good	30	71.42
Total	42	100.0

The frequency distribution of nutritional status in this study can be seen in Table 3. Physical fitness in this study was measured by a 12-minute walk/run test. With the help of computer software, the data analysis results obtained the lowest value of 1660 and the highest 2870, with the following central tendency figures: the mean (mean) of 2327.83; median = 2400.00; mode = 2400; and standard deviation of 317.532.

Table 3. Frequency Distribution of Nutritional Status

No	Nutritional Status	Absolute	Percentage (%)
1	Skinny	15	35.71
2	Normal	24	57.14
3	Fat	3	7.14
4	Obese	0	0
	Total	42	100

This study proves that the first hypothesis was rejected and stated that there was no positive and significant relationship between nutritional status and student achievement. In the product-moment correlation analysis ($r = 0.483$ with $p < 0.05$), it was stated that there was a significant relationship, but the results of the partial correlation analysis ($r = 0.380$ with $p > 0.05$) stated that there was no significant relationship. The frequency distribution of physical fitness is presented in Table 4.

Table 4. Frequency Distribution of Physical Fitness

No	Physical fitness	Absolute	Frequency Percentage (%)
1	Very good	-	-
2	Above average	6	14.28
3	Average	7	16.66
4	Below average	26	61.90
5	Poor	3	7.14
	Total	42	100

From the second hypothesis test results based on the first level partial correlation analysis between student learning achievement and physical fitness, where the nutritional status variable is controlled/controlled, the correlation coefficient is 0.452; count = 2.268 and with $p = 0.035$. Because the p-value is less than 5% ($p > 0.05$); then the correlation is significant. Thus, H_a , which states "there is a positive and significant relationship between physical fitness and student achievement," is accepted; and H_o , which states "there is no positive and significant relationship between physical fitness and student achievement," rejected; and concluded that there is a positive and significant relationship between physical fitness and student achievement.

Based on the above analysis, the results of the third hypothesis testing are also obtained with the achievement of student learning outcomes. The frequency distribution of student achievement is given in Table 5. This result is evidenced by the calculation results obtained by $R = 0.625$ and $F = 6.395$ with $p < 0.05$. Budiyanto (2001) explained that the factors that affect a person's nutritional status are (1) food products, (2) food distribution, (3) acceptability (acceptance), (4) bad prejudice on certain foodstuffs, (5) taboos on certain foods, and (6) the magnitude of the coefficient of determination preference for certain types of food. This finding means that student learning achievement can be explained by nutritional status and physical fitness of 39.0%, and variables outside this study determine the rest (61.0%). Based on the results above, it can be explained that the effective contribution of nutritional status to student learning achievement is 10.32%. This result means that the nutritional status of 10.32% can explain the level of student learning achievement. The effective contribution of predictors of student achievement to physical fitness is 39%. This finding means that the high and low student achievement can be explained by physical fitness of 39%. So, it can be stated that the two predictors can explain the increase and decrease in physical fitness in this study of 39.0%.

Table 5. Frequency Distribution of Student Achievement

No	Student Achievement	Absolute	Frequency Percentage (%)
1	Satisfying	1	2.38
2	Very satisfying	34	80.95
3	With compliments	7	16.66
	Total	42	100

Based on the results of data analysis and hypothesis testing, this study proves that the second hypothesis of this study is accepted and states that there is no positive and significant relationship between fitness and student achievement. In the product-moment correlation analysis ($r = 0.536$ with $p < 0.05$), it was stated that there was a significant relationship, and strengthened by the results of the partial correlation analysis ($r = 0.452$ with $p < 0.05$), it was stated that there was a significant relationship. The results of testing the third hypothesis prove that there is a positive and significant relationship between nutritional status and physical fitness with economic limitations, (8) eating habits, (9) appetite, (10) food sanitation (preparation, serving, storage), and (11) knowledge nutrition. Lund and Burk (1996), cited by Baliwati (2004), suggested that children's food consumption behavior model depends on the attitude, knowledge, and three main motivations for food. The family and environment strongly influence biological, psychological, and social needs (Black, 2019; Ye et al., 2021). Furthermore, based on calculations using the SPS 2005 software, it can also be stated that the relative contribution (SR%) and effective contribution (SE%) of each predictor are summarized in Table 6.

Table 6. Summary of the Weight of the Contribution of the Independent Variables to the Dependent Variable

Predictor	Contribution (SR)	Effective Contribution (SE)
Relative	%	%
Nutritional Status	26.46	10.32
Learning achievement	72.53	39.00

Based on Table 6, it can be explained that the effective contribution of nutritional status to student learning achievement is 10.32%. This result means that the nutritional status of 10.32% can explain student learning outcomes' high and low achievement. The effective contribution of predictors of student learning achievement to physical fitness is 39%. This finding means that the high and low achievement of student learning outcomes can be explained by physical fitness of 39%. So, it can be stated that the two predictors can explain the increase and decrease in physical fitness in this study of 39.0%. Furthermore, it is known that student learning achievement can be explained by nutritional status and learning achievement of 39.0%. This result means that the two predictors of 39.0% determine the increase or decrease in student physical fitness; the remaining 61.0% is explained by other variables not examined in this study.

Energy sources are needed for the body to carry out daily activities. Lack of energy will cause the body to become weak and unable to perform activities properly. For this reason, to meet the needs of energy sources, it is necessary to regulate a good diet (Brown, 2013). Physical fitness is the ability of a person's body to perform daily work tasks without causing significant fatigue (Chan, 2020). Physical fitness components consist of endurance, muscle strength, speed, agility, flexibility, balance, coordination, body composition.

According to Black (2019), one factor that affects physical fitness is nutrition or food. About nutritional status, which includes the fulfillment of food nutrition with the ability to carry out daily tasks that require physical fitness, it can be said that nutritional status has a relationship with physical fitness. In this regard, the relevance of which is very visible from the value of nutritional adequacy for the body, then based on the usefulness that can be obtained from food nutrients is to fulfill nutrients for the body, namely as a source of energy, building

material and regulatory material (Al-Dabal, 2010; Ranasinghe, 2020). To be able to perform daily tasks properly, energy is needed as a driving force. Thus, it can be said that to get physical fitness. Nutrition is needed; otherwise, the presence of nutrition can increase physical fitness.

Furthermore, based on the results of the research above, it can also be explained that the amount of effective contribution of each predictor to the criteria, based on the largest, is as follows: the effective contribution of nutritional status is 10.32%, and the effective contribution of learning achievement is 39%. According to Batmang (2021) and Bao (2020), other factors that affect the level of physical fitness are continuous activity programs or physical/physical exercise, eating well-nourished foods, resting, sleeping, relaxing, and maintaining adequate health. Oriented to the factors that affect a person's level of physical fitness, everyone is encouraged to eat with a food composition that contains a source of energy or energy to live and carry out daily activities such as working, studying, exercising, and doing other activities such as playing. This sport is often called physical activity to improve health and fitness. The positive benefits of exercise are increasing personal and psychosocial development, sleeping better, and even reducing dependence on alcohol (Goldschmidt, 2020 & Simpson, 2020). Exercise increases the response of cells and the immune system within seconds to minutes after starting to exercise. So, it is recommended to exercise regularly so that immunity is well maintained. Exercise increases the fight or flight stress response, meaning the body's response to stress will be better. The body can measure and react to stress more effectively (Astari, 2009; Tunç, 2020).

Conclusion

To examine the relationship between nutritional status and physical fitness level, a proper analysis is needed regarding its aspects. Nutritional status is the position of basic food substances needed for a person's body consisting of carbohydrates, proteins, minerals, salts, fats, vitamins, and water. The function of nutrition is to produce energy, build blocks and regulate substances. Based on the study results, it was found that there was no significant relationship between nutritional status and student achievement. There is a significant relationship between physical fitness and student achievement. There is a significant relationship between nutritional status and learning achievement with students' physical fitness. Physical fitness contributes to student learning achievement by providing an effective contribution of 39%, while the nutritional status of 10.32%.

The optimal level of physical fitness is obtained by doing regular exercise, adequate rest, and maintaining health and must be balanced with the fulfillment of the nutrients contained in the food consumed. This situation will affect a person's activity and will also affect the level of physical fitness. To be able to carry out daily activities well, humans need good physical fitness as well. Food or nutrition is one of the factors that need to be considered in improving physical fitness.

Based on the results of research and discussion, improving physical health and a sense of responsibility for health in students, and getting used to a healthy way of life are crucial. Improvement of physical health is only obtained through continuous exercise, by gradually increasing the training load. Someone who has high physical fitness will be able to carry out daily activities, such as studying longer than those with low levels of physical

fitness. The importance of physical fitness for students, among others, can improve the ability of organs, socio-emotional, sportsmanship, and the spirit of competition. This study proves that physical fitness has a positive correlation with academic achievement.

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Author Information

Syamsul Gultom


 <https://orcid.org/0000-0002-6364-2364>

Universitas Negeri Medan

Indonesia

Contact e-mail: syamsulgultom@unimed.ac.id


Baharuddin

 <https://orcid.org/0000-0002-2767-756X>

Universitas Negeri Medan

Indonesia


Dina Ampera

 <https://orcid.org/0000-0003-3252-2551>

Universitas Negeri Medan

Indonesia


Hesti Fibriasari

 <https://orcid.org/0000-0002-8009-4603>

Universitas Negeri Medan

Indonesia

Nurpelita Sembiring

 <https://orcid.org/0000-0003-3819-4990>

Universitas Negeri Islam Sultan Syarif Kasim Riau

Indonesia
