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The Correlational Analysis of Aerobic Gymnastics and The Students' Physical Fitness, and Their Learning Motivation at STIKES Hang Tuah Surabaya

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ABSTRACT
Background: *Health and intelligence are two important things to increase knowledge in education. The physical health will support psychology health to increase motivation. The aims of the research are to correlational analysis on aerobic gymnastics the students' physical fitness and their learning motivation at STIKES Hang Tuah Surabaya.*
Method: *the research design is correlational analysis with cross sectional approach. The number of populations are 58 with a sample of 50 was taken by simple random sampling. Univariate data were analyzed usingg the frequency distribution. Bivariate data were tested by using spearman rank with alpha <0.05.*
Results: *The statistical test with spearman ranks showed a significant relationship between the aerobic gymnastic and the students's physical fitness with p value of 0.022. There is a significant relationship between the aerobic gymnastic and their learning motivation with a p value of 0.027 which is smaller than alpha 0.05.*
Conclussion: *The aerobic gymnastic is able to optimize the suplly, intake and oxygen use in forming ATP which has an impact on students's physical fitness and their learning motivation.*

KEYWORDS
Aerobic gymnastic, physical fitness, learning motivation

INTRODUCTION

Health and intelligence are two important things to increase knowledge in education. Health according to Law Number 36 of 2009 is a healthy state, both physically, mentally, spiritually, and socially enabling everyone to live a productive life (Kemenkes RI, 2018). According to the World Health Organization (WHO), health is not just freedom from disease but a state of complete physical, mental, and social well-being. Meanwhile, according to Howard Gardner, intelligence is the ability possessed by someone to make the best decisions and solve problems (Syarifah, 2019). A healthy physique will support the learning process. However, health must be balanced by learning motivation to support the best learning outcomes. According to Rianto (2005), motivation is something from within or outside of oneself that moves a person, organization, or community to do or not do something (Laka et al., 2020). One of STIKES Hang Tuah Surabaya's efforts to synergize the two things above is programmed aerobic gymnastics. Aerobics is one of the exercises where when individuals make movements, the body requires more oxygen input (Dewi & Rifki, 2020).

Motivation as a soft skill in the learning

process is needed. This is because according to an assessment by the Program for International Student Assessment (PISA), Indonesia is included among the lowest countries that take part in learning assessments (OECD, 2018). The survey from the World's Most Literate Nations places Indonesia in 60th place out of 61 countries in terms of literacy skills (Central Connecticut State University, 2017). The Ministry of Education & Culture survey obtained data that the reading ability of Indonesian students was 46.83% in the Poor category, 47.11 in the Adequate category, and only 6.06% in the Good category (Kemdikbud,2017). This is further exacerbated by several studies reporting a decrease in students' and university students' learning motivation during the pandemic (Said, 2021 ; Wahyuningsih, 2022 ; Cahyani et al., 2020). It is possible that during the post-Covid-19 period, students will experience a decrease in motivation due to the prolonged lockdown. Likewise, at STIKES Hang Tuah Surabaya, students in various study programs must be prepared so they can anticipate post-covid effects related to learning motivation.

Based on data from interviews with 10 students, it was found that 7 students felt their bodies were fit after exercising. Then 5 out of 7 students said they were more motivated to learn, while 2 students felt mediocre. In addition, 3 students felt normal when they finished exercising and among the 3 students, only 1 (one) student said there was an increase in learning motivation while the other 2 felt there was no change in motivation after doing gymnastics. This needs special attention because, in the post-covid-19 era, health and motivation must continue to be improved. Scientific studies report that there are descriptions of emotional mental disorders in first-semester nursing students in the form of depression, anxiety, and stress (Adik et al., 2020). (Zollinger, 2017) reported a positive correlation between aerobic exercise and student learning readiness, where most students felt aerobic exercise increased their energy and ability to carry out various academic activities. Another study reported that aerobic exercise in a university environment can increase student learning motivation in class (Tamura et al., 2022). In addition, there are many studies showing a relationship between sports and student learning motivation (Zheng et al., 2023 ; Ferriz-Valero et al., 2020 ; Young-Jones et al., 2022).

Low motivation can be caused by intrinsic and extrinsic factors. Intrinsic factors include desire within oneself, the will to succeed, there is still hope and an optimistic outlook on future ideals. While extrinsic factors include learning motivation and needs, there is appreciation as a form of reward, for learning (Rahmawati et al., 2022). If students' motivation is low, it will affect students understanding of teaching materials. Furthermore, it also has an impact on the quality of graduates and learning achievement. This has

been conveyed in scientific studies where low learning motivation in students triggers and becomes the main trigger for a decrease in the quality of graduates (Laka et al., 2020). Furthermore, low student motivation affects competence which weakens the quality of human resources. Every individual needs motivation and if it is not fulfilled it can cause disturbances both physically and psychologically. Meanwhile, low motivation in nursing students will have an impact on their ability and creativity in problem-solving and caring behavior. There is a circular relationship between motivation and achievement, where motivation can trigger achievement and vice versa achievement can also trigger motivation. A study by Hasanah et al (2021) explains that the achievements of someone who is engaged in nursing can motivate adaptive behavior that can be observed through creative thinking, passion, and the ability to achieve achievements and caring behavior in service. While education is a very important thing in life because the world is advancing through education. However, if in the learning process, students, in this case, students, lack motivation, then the process will be less than optimal and have an impact on students' understanding of knowledge, achievement, and actualization (Riswanto & Aryani, 2017).

Strategic steps that can be taken to overcome the above problems are to optimize the various roles of the elements involved in the learning process. The first element is that the government as the policyholder through the role of the Ministry of Education and Culture must always improve the best learning formulas and systems in the country. The government as much as possible increases the budget for education funds so that it can facilitate the progress of education, especially for the nation's children who are still underprivileged and have potential. The second element is the role of the academic community as managers and implementers of education. The academic community must continue to think and strive for the best process in learning, fostering loyalty, creativity, innovation, and sincerity in educating the nation's children. One of the innovations that the Hang Tuah Surabaya STIKES community has implemented is aerobics together.

This activity is expected to improve the health and motivation of students at STIKES Hang Tuah Surabaya. The third element is parents and family at home. Even though they are not formally and directly involved in the learning process, the support of the family system is the energy to increase enthusiasm for learning. The fourth and most important element is the intention, will, enthusiasm, hard work, and a vision of success in the future. All of the above must be born from the conscience of the students themselves. Every student must be able to build good personal integrity and build dreams to participate in nation-building. Students must be

responsible for their roles and duties in the learning process. Students as change agents must raise personal awareness so that in the present and the future they can prove their dedication and achievements in science, and are efficient and proactive in contributing to national development. This study aimed to analyze the relationship between aerobic gymnastics and fitness and the learning motivation of Hang Tuah STIKES Surabaya students.

RESEARCH METHODOLOGY

Population and Sample

The population in this study were 58 students of the Bachelor of Nursing Study Program at the STIKES Hang Tuah Surabaya. The research sample was taken by simple random sampling technique and obtained number of 50 respondents. The research design uses correlational analysis with a cross-sectional approach that emphasizes observation time at a time. The independent variable in this study is aerobic gymnastics. While the dependent variable is physical fitness and learning motivation. Inclusion criteria in the study were students who were willing to become respondents and were willing to follow the research procedure until it was finished by counting the pulse after carrying out aerobic exercise activities and attending lectures after doing aerobics. This research has been ethically tested and received an ethical certificate PE/18/VI/2022/KEP/SH.

Instrument

The research design uses correlational analysis with a cross-sectional approach that emphasizes observation time at a time. The independent variable in this study is aerobic gymnastics. While the dependent variable is physical fitness and learning motivation. Physical fitness is assessed following physiological mechanisms and cardiovascular rhythms and results are obtained as fit or not fit. Learning motivation was assessed through a questionnaire with the interpretation of the results: low motivation (< 56%), moderate motivation (56% - 76%), and good motivation (76 - 100%). The instrument for collecting data on student learning motivation at Stikes Hang Tuah Surabaya uses a questionnaire containing demographic data and learning motivation. The motivational questioner consists of 10 questions, 5 of which are positive and 5 are negative.

Data Analysis

Univariate data were analyzed using the frequency distribution and bivariate data were tested using the Spearman Rank statistical test with alpha < 0.05.

RESULTS AND DISCUSSION

Research Results

Data from the research results are presented in tabular form and scientific explanations related to data in the field.

Table 1: Frequency Distribution of Respondents Based on Gender and Age STIKES Hang Tuan Surabaya Students

Respondent Characteristic	Frequency (f)	Percentage (%)
Gender		
Male	10	20 %
Female	40	80 %
Total	50	100 %
Age		
18 Year	15	30 %
19 Year	25	50 %
20 Year	7	14 %
21 Year	3	6 %
Total	50	100 %

Table 2: Frequency Distribution of Respondents Based on Grade Point Average and Breakfast for STIKES Hang Tuah Surabaya Students

Respondent Characteristic	Frequency (f)	Percentage (%)
Grade Point		
3,51 - 4,00	20	40 %
2,75 - 3,50	30	60 %
Total	50	100 %
Breakfast		
Get Breakfast	26	52 %
No Breakfast	24	48 %
Total	50	100 %

Based on Table 1 and 2, it was found that the majority of the respondents were female (80%) with an age 19 years (50%) and the majority grade point average (60%) of 2.75 - 3.50. Aerobics is a sport that is popular with the community and is easy to do and will be very lively if done together. Various factors can affect the best results in aerobics both physically and psychologically. Things that can affect, among others, gender and age affect physical fitness. While the GPA and breakfast activities have more influence on student learning motivation. The gender factor affects fitness after aerobics, one of which is due to differences in the speed of maximum oxygen (O2) usage in aerobic metabolic cycles (VO2Max).

A scientific study shows that the average VO2Max of male and female students is almost the same depending on the seriousness and accuracy of the movements during aerobics for 6 weeks. The study reported that in female students there was an increase in the VO2Max value from 21.84 ml/Kg/minute to 25.26 ml/Kg/minute with a p-value of 0.000. Whereas in male students there was an increase in the VO2Max value from 29.08 ml/Kg/minute to 34.07 ml/Kg/minute with a p-Value of 0.002 (Elmukhsinur & Yulianto, 2020). However, if you look at the differences in Multistage Fitness Test (MFT) scores, men tend to have better MFT scores than women after doing aerobics (Rumpoko & Sunjoyo, 2020).

While the age factor in individuals affects physical fitness which can be observed through several indicators. These indicators include body mass (BM), percent body fat (%BF), muscle mass, body mass index (BMI), lean body mass (LBM), and body fat (BF). All of the above elements continue to change with age (Sari, 2019). In addition, the process of cell and tissue degeneration can increase the process of tissue

damage and slow down bone formation which can reduce body fitness and activity, especially in the elderly (Ginting & Sinaga, 2022). In this study, the majority (78%) of the respondents were adolescents who physiologically all aspects of the balance of their organ systems were still functioning properly. So that perceived fitness can occur because of the accuracy of movements and maybe because of the balance of mechanisms in various organ systems in the body compared to more mature or elderly individuals.

Meanwhile, psychologically, gymnastics can affect learning motivation, especially for students who do have good achievements and breakfast patterns. A good grade point index will trigger individuals to continue to maintain their learning outcomes. Meanwhile, psychologically, gymnastics can affect learning motivation, especially for students who do have good achievements and breakfast patterns. A good grade point index will trigger individuals to continue to maintain their learning outcomes. In addition, good and correct breakfast habits will prepare the body to meet the needs of essential nutrients such as glucose, fat, and protein. Breakfast makes the body sufficient calories and glucose for activities throughout the day. Glucose is metabolized to pyruvate through glycolysis and completely oxidized to become ATP through the ATC cycle and oxidative phosphorylation (Rui, 2014).

Table 3: Frequency Distribution of Respondents Based on Gender, Age, and Student Achievement Index STIKES Hang Tuah Surabaya

Respondent Characteristic	Frequency (f)	Percentage (%)
Senam Aerobic		
Serious	37	74 %
Not Serious	13	26 %
Total	50	100 %
Fitness		
Fitness	31	62 %
Not Fitness	19	38 %
Total	50	100 %
Learning Motivation		
Good	15	30 %
Enough	27	54 %
Not Enough	8	16 %
Total	50	100 %

Based on Table 3, the data shows that most (74%) of the respondents took aerobics seriously so most (62%) felt fitter. While related to learning motivation, most (54%) stated that their learning motivation was sufficient, and almost half (30%) stated that their learning motivation was good after participating in aerobics on campus.

Sports activities that are carried out properly based on seriousness, regularity, and rhythmic movements make sufficient energy in the muscles and biological combustion takes place in balance. This makes the blood flow in the hemodynamic system and the delivery of oxygen and ATP as metabolic products to be in the best

homeostatic conditions so that the body is fitter. Good and correct aerobic exercise will optimize the adequacy of oxygen and energy which will impact body fitness. In addition, the adequacy of energy in the limbic system will also affect stress adaptation and motivation.

Table 4: The statistical test results for the relationship between aerobic gymnastics and Students' physical fitness of STIKES Hang Tuah Surabaya

Aerobic Gymnastic	Physical Fitness					
	Fitness		Not Fitness		Total	
	f	%	f	%	F	%
Serious	28	56	9	18	37	74
Not Serious	3	6	10	20	13	26
Total	31	62	19	38	50	100
p-value	**0,022**					

Based on Table 4, the results of statistical tests with Spearman ranks obtained a p-value of 0.022 which is smaller than α of 0.05. This shows that there is a significant relationship between aerobic gymnastics and student physical fitness, especially seen in students who are serious about following the gymnastic movements exemplified by the instructor.

Aerobic gymnastics which is carried out with a training intensity of 60% - 80% within 45-60 minutes can improve fitness, and health, and is beneficial in supporting children's growth and development (Dewi & Rifki, 2020). On the other hand, physical fitness is translated as the vitality of the body's condition in which the immune system, strength, creativity, and activity ability are at their best. Most of the respondents (54%) who took aerobic gymnastics seriously felt their bodies were fitter. According to the researchers, in this case, fitness was influenced by the respondents' seriousness in aerobics, where most of the gymnastics were carried out seriously. Seriousness following the rhythmic movements of aerobics will regulate energy needs so that ATP activity is always fulfilled throughout. Aerobic gymnastics that is done correctly with moderate to sub-maximal intensity is effective in optimizing oxygen uptake which is used as energy for physical activity (Dwijayanti & Firdaus, 2022). This is in line with a scientific study by Rumpoko & Sunjoyo (2020) where aerobics tends to be translated as the body's ability to take in, distribute and use oxygen to form adenosine triphosphate (ATP).

Scientifically, aerobic gymnastics makes the body fitter because various physiological systems of the body feel the effects of this gymnastics. Rhythmic movements give the musculoskeletal system sufficient energy and the circulatory system becomes more effective in meeting tissue energy needs (Wen & Wang, 2017). Aerobic gymnastics from the point of view of the respiratory system has a positive impact on the respiratory muscles and supports the expansion of the chest cavity which affects the smooth diffusion of oxygen (O2) and carbon dioxide (CO2). A study explains that regular body movement exercises will increase the ability of the respiratory muscles to process biochemical

changes that contribute to prolonged mechanical movements in the ventilation process (Powers et al., 2020). This allows for wider lung expansion, which increases a gas exchange in the diffusion process. In addition, blood circulation in the lung parenchyma will also have an impact on increasing O2 and Hemoglobin (Hb) bonds which are vital in life (Mazzeo & Liccardo, 2109). Apart from being respiratory, the physiological effects of aerobic gymnastics also positively impact cardiovascular function and are effective in inhibiting cell degeneration (Ginting & Sinaga, 2022). This is important in cardiorespiratory balance so that the body is always optimal and every part of the body's cells gets sufficient blood and energy supply (Indrayana & Yuliawan, 2019 ; Utamayasa, 2021). Aerobic gymnastics contribute sby improving the mechanisms of organs and organ systems, slowing down the process of decreasing function and increasing the body's resistance to infection (Harianja & Garini, 2021).

The adequacy of oxygen during aerobic gymnastics positively impacts the process of forming energy in the form of ATP. Movement mechanisms that are relatively regular and follow a rhythm can result in the optimization of aerobic metabolism that is balanced with oxygen input and energy output. Energy balance will strengthen the heart muscle and pump more blood throughout the body. Aerobic gymnastics fulfills the body's oxygen needs even though it is needed in large quantities (Dewi & Rifki, 2020). Aerobic metabolism that takes place in the first 3 minutes can produce energy release when glycogen is broken down into carbon dioxide (CO2) and water (H2O) to produce energy during gymnastics (Rosandi & Sudijandoko, 2022). Some aerobic gymnastics is also reported to activate muscle groups that stimulate aerobic metabolism and extract energy in the form of ATP from amino acids, carbohydrates, and fatty acids (Arum et al., 2021).

The availability of cellular ATP is important in providing power to a contraction in the musculoskeletal during gymnastics. The aerobic system keeps ATP stores in small muscles in balance with the rate of ATP resynthesis in active metabolic pathways. The breakdown of phosphocreatine and muscle glycogen during aerobic activity will result in homeostasis which allows substrate-level phosphorylation and oxidative phosphorylation of balanced carbohydrate, fat, and protein metabolism in the face of muscle contraction and energy resynthesis (Hargreaves & Spriet, 2020). Adequacy of ATP or energy in all parts of the network is what makes the body fitter and various organ systems get an energy supply according to the level of need.

A number of scientific studies have reported the benefits of aerobic gymnastics which optimizes the body’s physiological function, especially through aerobic metabolism. Aerobic

gymnastics releases many cytokines from skeletal muscle (namely myokine) that help support immune competence. Proinflammatory cytokines namely muscle-derived interleukin-6 (IL-6), and interleukin-7 (IL-7) which stimulate T cells from the thymus, and interleukin-15 (IL-15) on T cells and NK cells are actively involved in the immune system. immunity in the area of infection (Duggal et al., 2019). Increased immunity was also felt during the Covid-19 pandemic where aerobic gymnastics was able to improve fitness and quality of life (Arum et al., 2021).

Another benefit of aerobic gymnastics is improving the physical function of the elderly, reducing the risk of injury (Dipietro et al., 2019). improve eustress and blood glucose control in type 2 diabetes mellitus (Amir et al., 2021), reduce body weight (Hiklova & Gába, 2019), improve the haematological profile (Harianja & Garini, 2021) and relieve non-specific neck pain (Paraskevopoulos et al., 2023) as well as various other health benefits. As long as aerobics is done correctly and the intensity is maintained, various healthy and fit benefits can be felt.

Table 5: Statistical test results for the relationship between aerobic gymnastics and the student's learning motivation of STIKES Hang Tuah Surabaya

Aerobic gymnastics	Learning Motivation							
	good		enough		Not enough		Total	
	f	%	f	%	f	%	F	%
Serious	12	24	25	50	0	0	37	74
Not Serious	3	6	2	4	8	16	13	26
Total	15	30	27	54	8	16	50	100
p value	**0,027**							

Based on Table 5, the results of statistical tests with Spearman ranks obtained a p-value of 0.027 which is smaller than α of 0.05. This shows that there is a significant relationship between aerobic gymnastics and student learning motivation. Structured interviews with students after participating in aerobics, especially for those who seriously feel their bodies are fresher, more enthusiastic, and motivated to learn in class.

Aerobic gymnastics as explained earlier affects the respiratory system, and circulation, and increases blood flow through the lungs so that oxygen can diffuse into the pulmonary capillaries. Based on the mechanism of transporting oxygen to cells and tissues and returning CO2 from cells and tissues to the lungs, it can be seen that erythrocytes and haemoglobin also contribute to the supply of oxygen to the body. In addition, aerobic gymnastics can also increase the production of erythrocytes and facilitate the transportation of blood that binds oxygen to the tissues (Vieali et al., 2019).

If this system works properly, the blood and energy needs of the central nervous system will be fulfilled properly. Cerebral metabolism will take place in homeostasis and ATP will be supplied as needed. If bleeding in the area of motivation control in the central nervous system is optimal, then student learning motivation will increase. Aerobic gymnastics with moderate intensity can increase oxygen consumption in the cerebral system. Previous studies have also

explained that aerobic gymnastics activities can increase short-term memory's working power, which is important in information processing (Firdaus et al., 2019 ; Dwijayanti & Firdaus, 2022). According to Brown (2007), motivation can be cognitive behavioristic and constructivist in which the interaction of these elements influences the learning process (Christianto & Karin, 2019).

In addition, aerobic gymnastics is also useful in regulating mental stress and distress to maintain motivation and personal integrity. Aerobic gymnastics, carried out gradually through stretching, strength, balance, muscle, and joint flexibility, will reduce distress and other psychological disorders (Permadi, 2019). Decreased distress will increase individual coping abilities to be adaptive in processing any information in the learning process. Other research states that regular exercise is effective in treating chronic diseases and is beneficial in rejuvenating mental and physical health (Liu et al., 2019).

Mental health in individuals will have a positive impact on mood and motivation within the individual. If self-motivation is good, then psychologically a person will be encouraged to be enthusiastic and study hard. Scientific studies also prove that aerobic gymnastics which is routinely carried out as recommended can improve student learning outcomes (Dewi & Rifki, 2020). Easy and fun aerobic movements can increase intrinsic motivation and feelings of fun while learning in class. Respondents who said they were more motivated to learn looked more enthusiastic, more disciplined, had a high interest in reading, and were able to make problem-solving. This is by Sardiman (2018) that students who have high motivation will show enthusiasm, be diligent in doing assignments, be persistent in difficulties, have an interest in solving problems, not easily get bored with the same task, be able to hold on to their arguments when they feel confident in something.

Physiologically, aerobic gymnastics can optimize oxygen supply and ATP processes to provide strength internally to increase motivation. Moderate to strong support that physical activity benefits cognitive function during the early and late periods of life span and in certain populations characterized by cognitive deficits (Erickson et al., 2019). This means that in this case, any regular aerobic movement of the body has benefits for physical health and also a positive impact on cognitive abilities. However, if the exercises are lacking and are not by the mechanics of rhythmic body movements, then the cerebral blood circulation may decrease which will result in a decrease in motivation to a decrease in cognitive abilities. A study also explains that aerobic, resistance or a combination exercise increases several HrQoL components of self-assessment, both physical, appearance, and mental well-being (Collins et al., 2021). Meanwhile, the field of nursing is one of the

studies that can be considered comprehensive. This is because the nursing curriculum prepares graduates to understand many things in their roles and duties as providers of nursing care. Patterns of stress during college and some life problems tend to result in student stress. Stress in the field of nursing education is known as one of the most important issues in the modern world. Students tend to experience stress easily due to lifestyle changes (Adik et al., 2020).

If stress occurs, the mood will be disrupted, decreasing motivation. Aerobic gymnastics can have a good impact on stress levels and quality of life in older people (Permadi, 2019). If in the elderly with all the decreased organ function it is effective, then in adolescents and adults the positive effects of aerobic gymnastics will also be felt psychologically. Motivation for students who take aerobics well and seriously can be seen in concentration, curiosity, enthusiasm, passion, independence, readiness, and self-confidence. So it is not excessive if aerobic gymnastics besides having a positive physical impact also has a positive psychosocial impact, one of which is by increasing motivation.

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CONCUSSION

Aerobic gymnastics can optimize the provision, uptake, and use of oxygen in forming ATP. Sufficient ATP levels at hemostatic levels will have a physical impact on physical fitness and a psychological on student learning motivation. Researchers recommend implementing aerobic exercise programs to improve students' physical, mental, emotional and learning motivation.

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