

## Differences in the Effect of aerobic sports and exercisemotivation on students' physical fitness Diferencias en el efecto de los deportes aeróbicos y la motivación para hacer ejercicio en la aptitud física de los estudiantes

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**Abstract.** Abstract Background/Problems. The problem in this research was the low level of physical fitness of female students at Senior High School (SMK) An-Nur, Padang City. This was suspected by the lack of sports activities carried out by female students—for study purposes. The research aims to see 1) the effect of aerobic exercise on female students' physical fitness, 2). Differences in physical fitness of female students with high and low exercise motivation. 3). Interaction between jogging and aerobic exercise with exercise motivation on physical fitness, 4). Differences in the physical fitness of female students in the jogging sports group and the aerobics group in female students with high exercise motivation. 5). Differences in physical fitness of female students in the jogging sports and aerobics groups in female students with low exercise motivation. Materials and Methods. The research type was experimental, using a 2 x 2 ANOVA design. This research used a purposive sampling technique, and then a motivational questionnaire test was carried out; after the motivational questionnaire data was obtained, it was divided into 5 people per group using the Matching technique to obtain a sample of 20 female students. Furthermore, the treatment was given 16 meetings (8 weeks). The tests used in this study were the initial and final, namely the physical fitness tests with the 2400-meter running tests. Results. The results showed: 1). There was no difference in the physical fitness of the jogging and aerobics groups. 2). The physical fitness of the high exercise motivation group was better than that of the low. 3). There was an interaction between jogging and aerobic exercise with exercise motivation on female students' physical fitness. 4). The physical fitness given jogging exercise was better than the aerobic exercise group in the group with high exercise motivation. 5). The physical fitness of the jogging group was lower than the aerobics group in the group with low exercise motivation. Conclusions. Based on the findings, it can be concluded that both jogging and aerobic exercise influence the physical fitness capacity of An-Nur Vocational High School students in Padang City. The benefits of research for teachers was to guide for learning and for further research was to guide in future research.

**Keywords:** Aerobic Sports, Motivation, Physical Fitness, Students

**Resumen.** Antecedentes abstractos/Problemas. El problema de esta investigación es el bajo nivel de aptitud física de las estudiantes de SMK An-Nur, ciudad de Padang. Esto se sospecha por la falta de actividades deportivas realizadas por las estudiantes. Propósito del estudio. La investigación tiene como objetivo ver; 1). Efecto del ejercicio aeróbico sobre la condición física de las estudiantes, 2). Diferencias en la aptitud física de las estudiantes que tienen una alta motivación para el ejercicio y una baja motivación para el ejercicio. 3). Interacción entre jogging y ejercicio aeróbico con motivación para el ejercicio sobre la aptitud física, 4). Diferencias en la condición física de las alumnas del grupo de deportes de jogging y del grupo de aeróbic en alumnas que tienen alta motivación por el ejercicio. 5). Diferencias en la aptitud física de las alumnas del grupo de deportes de jogging y del grupo de aeróbicos en alumnas que tienen baja motivación para el ejercicio. Materiales y métodos. El tipo de investigación fue experimental utilizando un diseño ANOVA 2 x 2. Esta investigación utilizó la técnica de muestreo intencional luego se realizó una prueba de cuestionario motivacional, luego de obtener los datos del cuestionario motivacional se dividió en 5 personas por grupo mediante la técnica de Matching de modo que se obtuvo una muestra de 20 alumnas. Además, el tratamiento se realizó durante 16 sesiones (8 semanas). Las pruebas utilizadas en este estudio fueron la prueba inicial y la prueba final, es decir, la prueba de aptitud física con la prueba de carrera de 2400 metros. Resultados. El resultado mostrado, 1). No hubo diferencias en la condición física del grupo de jogging y el grupo de aeróbic. 2). La aptitud física del grupo con alta motivación para el ejercicio fue mejor que la del grupo con baja motivación para el ejercicio. 3). Existe una interacción entre el jogging y el ejercicio aeróbico con la motivación para el ejercicio en la condición física de las estudiantes. 4). La condición física que recibió ejercicio de jogging fue mejor que la del grupo de ejercicio aeróbico en el grupo que tenía una alta motivación para hacer ejercicio. 5). La aptitud física del grupo de jogging fue menor que la del grupo de aeróbicos en el grupo con baja motivación para el ejercicio. Conclusiones. Con base en los hallazgos, se puede concluir que el jogging y el ejercicio aeróbico influyen en la capacidad física de los estudiantes de la escuela secundaria vocacional An-Nur en la ciudad de Padang. Los beneficios de la investigación son que, para los docentes puede ser una guía para el aprendizaje, para investigaciones posteriores como una guía en futuras investigaciones.

**Palabras clave:** Deportes Aeróbicos, Motivación, Aptitud Física, Estudiantes

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### Introduction

Fostering the younger generation to form quality human beings can be realized through sports activities. The quality of the younger generation can be improved by increasing physical fitness. Physical fitness is a set of attributes that reflect tolerance to physical activity and can be measured by specific tests. Exercise refers to planned

physical activity that is structured and repetitive, with a certain intensity, frequency and duration (Machado, 2021).

Physical fitness is the body's ability to make adjustments (adaptation) to physical liberation (Zenit et al., 2020). Physical fitness reflects the ability to function systems in the body (Angulo et al., 2020). Physical fitness is the body's ability to carry out physical and psychological

activities without extreme fatigue (Castro Garrido et al., 2020).

Aerobic exercise is an activity that helps to improve and maintain the health and endurance of the heart, lungs, blood circulation, muscles and joints (Wahid & MB, 2021). Regular sports exercise will greatly influence our bodies (Mackay-Lyons et al., 2020). Physical exercise with a certain load will change the body's physiology, which will change the level of physical fitness (Dharma & Boy, 2020). Aerobic exercise is a systematic sporting activity with a gradual and continuous increase in load that uses energy derived from combustion using oxygen and requires oxygen without causing fatigue (Castro Garrido et al., 2020; Hardinata et al., 2023).

Aerobic gymnastics is an aerobic exercise type that requires a lot of oxygen (Shou et al., 2022), so aerobic exercise is often referred to as general endurance (Ihsan & Syafrizal, 2023). Because aerobic exercise requires much oxygen (Klusiewicz et al., 2021), exercise can last a long time. It can increase the body's cardiovascular capacity to take in oxygen and distribute it to all muscle cell tissues so that oxygen can combine with nutrients to produce energy for carrying out activities (Mario et al., 2022; Welis, 2024).

Jogging is an aerobic sport which, if we do it regularly, will be beneficial for our body. Jogging is said to be an aerobic exercise if it is done for a long time, and the intensity of the exercise ranges from 70-85% of the maximum pulse (Khundam & Noël, 2021). Jogging is a sport that can be done to maintain health (Salazar-Ruiz et al., 2023). From some of the definitions above, it can be concluded that jogging is a sport that is included in the type of aerobic exercise where the activities carried out are useful for improving body health, especially physical fitness.

Besides, motivation is very helpful to improve one's physical fitness. Motivation is a dynamic driving and driving force (Fahrizqi et al., 2021). Achievement motivation in athletes can be related to affiliation motivation (Saez-Michel et al., 2023), namely fostering a sense of responsibility to support height and maintain the good name of the group or team where individuals join. Motivation can be interpreted as encouragement or enthusiasm within a person to succeed in a job (Diller et al., 2023).

Based on observations, the activities of students at school, both in the learning process and outside of class hours, were observed, and then it was observed that their physical fitness was low. Based on the results related to the low physical fitness of students, namely: Student Health and its Relation to Physical Fitness Levels (Bahtra et al., 2023; BAKHTIAR et al., 2023; SEPTRI et al., n.d.), Evaluation of Physical Fitness Levels in Female Physical Education Students Using the "Europhyt-Test" (Souza de Carvalho et al., 2023). Female students' low physical fitness level is due to several factors, one of which is the absence of additional sports activities to improve their

physical fitness.

Based on the problems above, this study aims to determine the effect of aerobic exercise. It was programmed and regularly given for 16 meetings. It was seen whether their differences in aerobic exercises, such as jogging with aerobics namesake, will have a different effect on female students' degree of physical fitness.

## Materials and Methods

The research type was quasi-experimental research. The variables in this study were independent variables, namely jogging aerobics (X1) and aerobic exercise (X2). The moderator variable was motivation to exercise (X3). The independent variable was the students' physical fitness level (Y). The experimental design was Treatment By Factorial 2 x 2. The population in this study were all female students at SMK AN-NUR, Padang City, which amounted to 46 people. The sample in this study were students in grades 10 and 11, which amounted to 20. The data needed in this study were physical fitness test data and the value of female students' motivation to exercise. The instrument used to collect data from the variables of motivation to exercise in this study was a questionnaire with a Likert scale. As for physical fitness, namely the 2,400-meter running test. Cooper, a Physical Education and Sports test expert, created this test. The 2,400-meter run test measures a person's physical fitness condition through aerobic measurements of running 2,400 meters.

During the research, athletes were grouped according to categories of high and low motivation to exercise. Before giving treatment, the sample was given a pre-test, namely a 2,400 m running test. After that, I was given aerobic exercise treatment for 16 meetings three weeks a week. After being given 16 weeks of treatment, a post-test was given to see if there was a significant increase related to the treatment that had been given.

Table 1. Training Program

	TRAINING PROGRAM	
	AEROBICS	JOGGING SPORTS
Number of Meetings	16 Meetings	16 Meetings
Duration of each meeting	60-90 Minutes	60-90 Minutes
Training Intensity	50-75 %	50-75 %
Recovery	5 minutes	5 minutes

Table 2. Sample groups and types of sports

Sport aerobics	Aerobic Exercise (A)	
	Jogging Aerobics (A <sub>1</sub> )	Aerobic Gymnastics (A <sub>2</sub> )
Motivation Exercising (B)		
Height (B <sub>1</sub> )	A <sub>1</sub> B <sub>1</sub>	A <sub>2</sub> B <sub>1</sub>
Low (B <sub>2</sub> )	A <sub>1</sub> B <sub>2</sub>	A <sub>2</sub> B <sub>2</sub>
Total	A <sub>1</sub>	B <sub>2</sub>

## Result

### Normality test

Data normality test for each group (cell) was analyzed using Kolmogorov-Smirnov with SPSS, Table 18.

## Normality Test of Physical Fitness Levels of Students of SMK An-Nur Padang.

Table 3.

Normality Test Data				
Group	N	Lo	L table	Ket
A1	10	0.141	0.258	Normal
A2	10	0.227	0.258	Normal
B1	10	0.176	0.258	Normal
B2	10	0.224	0.258	Normal
A1B1	5	0.256	0.337	Normal
A2B1	5	0.249	0.337	Normal
A1B2	5	0.225	0.337	Normal
A2B2	5	0.331	0.337	Normal

Based on the table above, the summary of the results of the data normality test for all groups stated that in the  $Lo < L_{table}$ , it can be concluded that the data for all groups obtained came from populations with normal distribution.

### Homogeneity Test

The homogeneity of variance tests carried out in this study were cell groups in the research design, namely cell groups  $A_1B_1$ ,  $A_1B_2$ ,

$A_2B_1$  and  $A_2B_2$ . The test criterion is  $H_0$  accepted if  $X_{hitung} < X_{tabel}$  at a significant level  $\alpha = 0.05$ . The following is a summary of the results of the homogeneity of variance using SPSS.

Levene's Test price with statistics  $F = 2.640$  with db 3 and 16 at  $p\text{-value} = 0.65 > 0.05$  or  $H_0$  accepted. So the four sample data ( $A_1B_1$ ,  $A_1B_2$ ,  $A_2B_1$ ,  $A_2B_2$ ) have the same or homogeneous variance. If seen from  $F_{hitung}$ , the four samples can be said to be homogeneous if  $F_{hitung} < F_{tabel}$ . From the statistical results obtained  $F_{hitung} = 2.640$  while  $F_{tabel} = 3.24$ , the four data are the same or homogeneous.

Based on the measurement results of the jogging group, which consisted of 2 sample groups ( $n = 10$ ), the highest value = 97.21, the lowest = 92.19, the average = 92.57, and the standard deviation = 3.77. The results of the sample measurements in this group, consisting of 2 sample groups ( $n = 10$ ), obtained the highest score of 95.12, the lowest score of 90.49, the mean = 92.12, and the standard deviation = 1.84. Based on the measurement results of the high exercise motivation group, consisting of 2 sample groups ( $n = 10$ ), the highest score was 97.21, the lowest score was 89.46, the average was 93.90, and the standard deviation was 2.66. Based on the results of sample measurements in this group, consisting of 2 sample groups ( $n = 10$ ), the highest score was 91.57, the lowest score was 83.06, the average was 90.79, and the standard deviation was 2.29.

The measurement results for the jogging sports group with high exercise motivation, consisting of 1 sample group ( $n = 5$ ), obtained the highest score of 97.21, the lowest score of 93.41, the average was 95.46, and the standard deviation was 1.61. Based on the results of jogging exercise data with low exercise motivation, which consisted of 5 samples, the highest score was 93.06, the

lowest score was 86.40, the average was 89.678, and the standard deviation was 2.911. Based on the results of aerobic exercise training data with high exercise motivation, which consisted of 5 samples, the highest score was 95.26, the lowest score was 90.49, the average was 92.34, and the standard deviation was 2.69. Based on the results of the sample measurements in this group, which consisted of one group ( $n=5$ ), the highest score was 92.46, the lowest score was 91.40, the average was 91.90, and the standard deviation was 0.51.

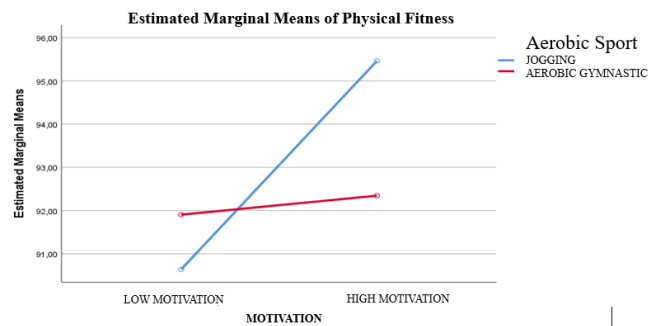


Figure 1. The Data normality test for each group (cell) was analyzed using Kolmogorov-Smirnov with SPSS

The results of the variance homogeneity test using SPSS. The results obtained were Levene's Test prices with statistics  $F = 2,640$  with db 3 and 16 at  $p\text{-value} = 0.65 > 0.05$ , or  $H_0$  was accepted so that the four-sample data have the same or homogeneous variance. Based on the statistical results obtained,  $F_{count} = 2.640$  while  $F_{table} = 3.24$ , the data was the same or homogeneous.

## Discussion

The testing result of the first hypothesis showed that there was no significant difference between the jogging group and the aerobics group. This was illustrated by the results of the two-way analysis of variance, which stated that  $F_0 (1.220) < F_t (4.49)$ . That was, the proposed research hypothesis was not verified (rejected). This hypothesis was rejected due to several factors, especially in the training program and the implementation of training in the field. These factors could be the time of giving a short exercise program or the form of exercise in the training program. The forms of exercise were very influential on practice (Alex et al., 2024). Aerobics exercises contained elements of varied movements and interesting media, so they attracted students' attention to doing aerobics activities.

In contrast, there were no varied but monotonous movements in jogging exercises, so students are not interested in doing jogging activities. A monotonous exercise that does not vary in practice greatly influences student practice results (Khirom, 2021). In addition to the factors of training in the field, physiological factors influence and determine female students' physical fitness level (Calvo-Paz & Carrillo-arango, 2024). This was

because the physiological abilities of each individual are different. Age and gender affected students' physical fitness (Sepriadi et al., 2023). Attitude and behavior factors also affect student training results because each student has different attitudes and behavior (Eko et al., 2024). The results of testing the second hypothesis indicated that there were differences in the level of physical fitness of students at SMK An-Nur Padang City who have high exercise motivation and students who have low exercise motivation. Motivation drives a person or athlete to carry out activities (Chirico et al., 2021). Motivation is encouragement, both from within and from outside the individual, to carry out activities, and it can determine how much effort needs to be exerted to achieve the goals that have been set (Bafirman et al., 2023). Motivation was considered the main ingredient for pursuing goal success and achieving desired results and well-being (Aryadi, 2020). Motivation greatly influences students' sports activities (Fahrizqi et al., 2021). Forming motivation within students themselves (Self-Motivation) will encourage students to learn to develop and master various knowledge (Firmadani, 2020). The results of testing the third hypothesis indicated that there was an interaction between aerobic exercise and exercise motivation on the physical fitness of An-Nur Vocational High School students in Padang City. Choosing the right training method was very decisive for the results of the training to be achieved, especially in order to improve the physical fitness of female students (Nurdiana, 2021). There was an interaction between jogging and aerobics with exercise motivation on the physical fitness of An-Nur Vocational High School students in Padang City. The results of testing the fourth hypothesis showed that the physical fitness level of An-Nur Vocational High School students in Padang City who were given the Jogging exercise method was better than those who were given aerobic exercise in a group of female students with high exercise motivation. Aerobic gymnastics can develop organic aspects in students (Haetami & Triansyah, 2018). Aerobic exercise can develop perceptual aspects. Aerobics was chosen as a fun sports activity because it could improve and develop perceptual, cognitive, and social (Doris, 2019). The advantages of aerobics are that it is easy to organize, can be done in bulk, and is not too wide (Mackay-Lyons et al., 2020). While the weakness of aerobic exercise was the intensity of the exercise is sometimes not achieved if the choreography is difficult to do, and often many do not do it (Izquierdo et al., 2021), jogging is very effective for improving cardiovascular (Wajib et al., 2022). Jogging is good for burning fat, and it is easy and cheap to do (Fathurrahman et al., 2020). It was clear that there are distinct advantages to jogging, which improved the physical fitness of female students because movement activity continues to increase. Meanwhile, if looking at the movement activity in aerobic exercise, the movement of the activity without increasing the load was quite significant, so the increase in physical fitness was not

too fast.

The results of testing the fifth hypothesis showed that the level of physical fitness of the jogging group was lower than that of the students who were given aerobic exercise in the low exercise motivation group. The advantage of jogging is that the muscles contract more together (Flores, 2024). Jogging was very effective in improving cardiovascular (Pedisic et al., 2020). The weakness of jogging is that it is monotonous, and there is no variation in exercise (Carolina et al., 2024). Meanwhile, aerobic exercise has variations in movement (Lamošová et al., 2021). It was clear that there were distinct advantages to aerobic exercise, which this exercise would increase the enthusiasm of students to practice because there were varied movement activities accompanied by media. Seeing the monotonous jogging sports activities and the added heavy training load, students were not enthusiastic about jogging activities, so that the increase in physical fitness was not too fast.

## Conclusions

There was no significant difference in the physical fitness of female students in the jogging sports group and female students in the aerobics group. There were differences in the physical fitness of female students in the high exercise motivation group and those in the low exercise motivation group. There was an interaction between jogging and aerobic exercise with motivation to exercise on physical fitness. The physical fitness level of the jogging group's female students was better than that of the aerobics group in the female students with high exercise motivation. The physical fitness level of the jogging group was lower than that of the aerobics group in the low exercise motivation group.

## Suggestion

Teachers should be able to choose and use appropriate exercises in an effort to improve the physical fitness of female students. The students who took part in the training had to be even more serious so that they could get positive results from the training sessions that were carried out. In addition, training motivation needs to be increased. This study was limited to An-Nur Vocational High School students in Padang City with a limited population and sample of 20 students. Therefore, researchers who wish to continue this research in order to make this research as information and reference material, as well as increase the number of research samples. Principals and teachers can play an active role in improving the physical fitness of these students.

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