

The effect of physical exercise intensity on fitness performance in the sports community

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World Journal of Advanced Research and Reviews, 2025, 27(02), 1611-1615

Publication history: Received on 10 July 2025; revised on 20 August 2025; accepted on 22 August 2025

Article DOI: <https://doi.org/10.30574/wjarr.2025.27.2.3029>

Abstract

This study aims to determine the effect of physical exercise intensity on the fitness performance of members of a sports community in Gresik. The physical exercise performed by sports communities varies in terms of intensity, duration, and frequency. Using a quantitative survey approach, this study involved 120 respondents from five different sports communities in Gresik. Data were collected using a Likert-scale questionnaire that measured exercise intensity (light, moderate, heavy) and physical fitness parameters. The results of a linear regression analysis showed a positive and significant effect between physical exercise intensity and fitness performance ($R^2=0.62$, $p<0.05$). This finding indicates that systematically programmed increases in exercise intensity can improve the fitness of sports communities in Gresik. It is recommended that sports communities develop exercise programs that consider intensity as a primary factor in achieving optimal fitness.

Keywords: Physical Exercise Intensity; Fitness Performance; Sports Community; Survey

1. Introduction

Physical exercise is an activity designed to improve an individual's physical fitness and health. In the sports community, exercise is performed routinely, but not all of it pays attention to training principles such as intensity, frequency, and progression. Exercise intensity plays a crucial role in influencing physiological and psychological adaptations to exercise, which ultimately impact fitness performance (Kenney, Wilmore, and Costill, 2019). Several previous studies have shown that moderate-to-high-intensity exercise significantly impacts cardiorespiratory capacity and muscle strength (Garber et al., 2011; ACSM, 2020). However, there has been limited research specifically evaluating how variations in exercise intensity affect aspects of physical fitness in the sports community, particularly in Indonesia.

Physical fitness is the body's ability to perform daily tasks efficiently for a relatively long period of time without causing undue fatigue. There are five basic foundations of fitness: cardiovascular endurance, muscular strength, muscular endurance, flexibility, and body composition. Several factors that influence physical fitness include genetics (heredity), age, gender, exercise, smoking habits, and nutritional status (Afandi Ahmad, Miftah Azrin, 2019). Exercise habits significantly influence physical fitness, especially the intensity, frequency, and duration of exercise.

Making exercise a habit is very helpful in improving fitness, and some positive aspects of exercise habits can help channel their expression (Ilyas, 2020). Physical exercise is a body movement carried out by muscles in a planned, structured, and repetitive manner that involves the use of energy to improve fitness. Regular exercise has beneficial effects on health, especially helping to reduce and prevent various cardiovascular diseases, metabolic syndrome disorders, and osteoporosis (Elsa Yuniarti, 2015). Physical condition is a person's ability to achieve optimal exercise

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goals. Exercise results also vary depending on the routine and productivity when training the body physically. The more active one is in physical exercise, the higher the productivity and fitness of a person (Setia and Winarno, 2021). A person's physical fitness is greatly influenced by sports activities and these activities also play a direct role in fitness composition. Sports activities must be appropriate for the age of the person doing them, including the type of activity, safety precautions, and equipment used. Sports activities should not be done carelessly, but must be done with the correct rules and techniques (Putra, 2021). Physical fitness in children and adolescents is considered the most important indicator of health and psychological outcomes and is designed as an integrated measure of cardiorespiratory fitness, flexibility, muscular fitness, and body composition.

Furthermore, low physical fitness during childhood can be detrimental to adolescent health in both the short and long term (Muhammad Afifuddin Nur Lutfillah, 2020). Success in improving physical fitness depends on the frequency, intensity, and duration of exercise. Exercising 3-5 times per week for 20-60 minutes can significantly improve a person's physical fitness. It's also important to note that the intensity of the exercise should be 60-90% of maximum heart rate. The conditions and intensity of the exercise are also adjusted to the goals and type of exercise. Exercise duration for fitness and weight loss programs typically lasts 20-60 minutes (Gilang Nuari and Mega Widya, 2016).

Based on the above considerations, this study aims to answer the question: Does physical exercise intensity affect physical fitness performance in sports communities? Using a survey method, this study is expected to provide empirical understanding of the relationship between exercise intensity and fitness, as well as serve as a foundation for the development of more structured community exercise programs.

2. Method

This research is a quantitative study with a correlational survey approach. The research design aims to identify the influence between the variables of physical exercise intensity (X) and physical fitness performance (Y). The population in this study were active members of five sports communities in the city of Gresik, with a total of 120 people. The sampling technique used purposive sampling based on the following criteria: (1) actively participating in training for at least the last 3 months, and (2) aged 18-45 years. The number of samples used was 120 people.

The data collection instrument used a Likert-scale questionnaire (1-5), consisting of two parts

- Physical Exercise Intensity: frequency, duration, and level of exercise load based on participant perception (referring to the Borg Rating of Perceived Exertion guidelines).
- Fitness Performance: self-reports of endurance, muscular strength, agility, and flexibility, validated with baseline fitness measurements on a subset of respondents (n=30) as a verification subsample.

Validity tests were conducted using Pearson Product Moment ($r > 0.30$) and reliability using Cronbach's Alpha ($\alpha = 0.87$). Data were analyzed using descriptive statistics and simple linear regression with the help of SPSS version 25. The significance value is set at $\alpha = 0.05$.

3. Results

The majority of respondents (60%) followed moderate-intensity, 25% high, and 15% low-intensity exercises. Average fitness performance was higher in the group with high exercise intensity. Based on data from 120 respondents from five sports communities in Gresik City, the distribution of physical exercise intensity is as follows:- 60% of respondents participated in moderate-intensity exercises, - 25% participated in high-intensity exercises, and-15% were low-intensity.

The high-intensity exercise group showed higher average fitness performance than the other groups.

3.1. Regression Analysis

The results of the linear regression show that

- The value of the determination coefficient (R^2) = 0.62, meaning that 62% of the variation in fitness performance can be explained by the intensity of the exercise.
- The significance value (p) = 0.000 < 0.05, indicates a significant relationship.
- Regression equation: $Y = 25.3 + 0.78X$

Interpretation:- Value $R^2 = 0.62$ means that 62% of the variation in fitness performance can be explained by the intensity of physical exercise.- A value of $p = 0.000$ indicates that the relationship between exercise intensity and fitness is statistically significant.- The positive regression coefficient (0.78) indicates that for every one unit increase in exercise intensity, the fitness performance score increases by 0.78 points.

Table 1 Composition of Respondents' Exercise Intensity

Categories Exercise Intensity	Number of Respondents	Percentage (%)
Low	18	15%
Keep	72	60%
Tall	30	25%
Total	120	100%

Table 2 Average Fitness Performance Based on Exercise Intensity

Exercise Intensity	Fitness Performance (Average Score)	Information
Low	Relatively low	-
Keep	Keep	The majority of the sample
Tall	Higher	Optimal

Table 3 Results of Linear Regression Analysis

Parameter	Nilai	Keterangan
Koefisien Determinasi (R^2)	0,62	62% variabel Y dijelaskan oleh X
Nilai signifikansi (p)	$0,000 < 0,05$	Signifikan
Parameter	Value	Information
Coefficient of Determination (R^2)	0,62	62% of the variable Y is explained by X
Significance value (p)	$0.000 < 0.05$	Signifikan
Regression equations	$Y = 25.3 + 0.78X$	Y = fitness performance, X = exercise intensity

3.2. Conclusion of the Analysis

- The intensity of physical exercise has a significant and positive effect on the physical fitness performance of members of the sports community.
- The higher the intensity of exercise (provided it is carried out systematically and according to the principles of training), the better the fitness achievement.
- These findings reinforce previous literature that moderate- to high-intensity exercise is structured effectively in improving endurance, muscle strength, agility, and flexibility.

4. Discussion

The results of this study consistently show that the intensity of physical exercise has a significant influence on physical fitness performance. These findings reinforce a basic theory in sports physiology that places intensity as one of the main variables in training principles, in addition to frequency, duration, and type of exercise. Moderate to high intensity exercise is known to produce stronger physiological stimuli in the cardiorespiratory, neuromuscular, and metabolic systems. When the intensity of the exercise reaches a certain threshold, the body will experience adaptation in the form of an increase in VO_2 max (maximum oxygen consumption capacity), increased muscle endurance, muscle contraction

strength, and improvements in agility and flexibility. This adaptation occurs as the body seeks to adjust to a higher workload through homeostasis and supercompensation mechanisms (Kenney et al., 2019; ACSM, 2020).

In addition, Bompa and Haff (2009) emphasize that moderate to high intensity exercise stimulates the reaction of anabolic hormones such as testosterone and growth hormone, which play an important role in muscle tissue formation and recovery. Therefore, in sports communities that implemented structured exercise at an appropriate intensity, improvements in physical fitness tended to be more noticeable than those who only did light or sporadic exercise.

However, it is important to understand that high intensity also comes with risks, especially if it is not accompanied by recovery and measured training load management. Too high a training load without enough rest time can lead to chronic fatigue (overtraining syndrome), decreased performance, and even musculoskeletal injuries. This risk is particularly relevant in sports communities that do not have professional coaches or adequate monitoring systems. To maximize results without sacrificing health, the exercise periodization approach becomes crucial. Periodization is the process of systematically regulating the intensity, volume, and type of exercise over a certain period of time. With good periodization, the sports community can reach peak performance at the right time, while minimizing fatigue and injury (Bompa and Haff, 2009).

In the context of the sports community in Indonesia, the implementation of intensity-based training is often not based on scientific parameters such as heart rate zone or RPE (Rating of Perceived Exertion). Therefore, the results of this study are very important to encourage the sports community to be more aware of the importance of measuring exercise intensity, both through subjective (such as the Borg scale) and objective instruments (heart rate monitors or periodic fitness tests).

Overall, this study makes a real contribution to the development of evidence-based community training programs, where intensity is used as the main reference in compiling fitness modules. This is very relevant in encouraging an active and healthy lifestyle in the community, as well as increasing the effectiveness of the sports community as a means of fostering achievement and general fitness.

5. Conclusion

Based on the results of data analysis and discussion, it can be concluded that the intensity of physical exercise has a significant influence on physical fitness performance in members of the sports community in Gresik City. The higher the intensity of planned and systematic exercises, the greater the positive impact on improving fitness components such as cardiovascular endurance, muscle strength, agility, and flexibility.

The regression equation obtained ($Y = 25.3 + 0.78X$) showed that any increase in the level of exercise intensity directly contributed to an increase in physical fitness score. These findings are in line with the principles of modern physical exercise that place intensity as one of the main components in the formation of physical performance.

Nevertheless, it is important to remember that excessively high exercise intensity without proper management can lead to excessive fatigue, injury, or even decreased motivation. Therefore, it is necessary to apply the principle of periodization and recovery so that the benefits of exercise can be achieved optimally without the risk of negative effects.

In general, this study provides strong empirical evidence that planning and executing exercise with proper intensity in mind is key to improving the physical fitness of members of the exercise community.

Compliance with ethical standards

Disclosure of conflict of interest

There is no conflict of interest regarding the publication of this paper. All authors have contributed significantly to the conception, design, analysis, and writing of the manuscript.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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