



## The Effect of Continuous Running Training Programs and Interval Training Programs in Improving Physical Fitness

Asma Bara \*<sup>1</sup>, Tatang Muhtar <sup>2</sup>, Dewi Susilawati <sup>3</sup>

<sup>1,2,3,4</sup> Physical Education, Universitas Pendidikan Indonesia, Sumedang, Indonesia

### Article Info

#### Article History :

Received : November 2023

Revised : December 2023

Accepted : December 2023

#### Keywords:

Continuous Running,  
Interval Running, Physical  
Fitness, Training Program,

### Abstract

This study carried out an in-depth analysis of two popular physical training programs: continuous running and interval training. The research method involved a number of statistical tests, including checking the normality of data distribution, uniformity analysis, and independent T tests. Participants from both training programs were used to gain a more detailed understanding of the nature of each program and comparisons of performance between the two. The analysis results show that continuous running approaches a normal data distribution, indicating data stability and consistency. Meanwhile, the finding that performance variability was similar across the two programs led to new insights into the consistency of performance within the groups. The main finding was the superiority of continuous running in performance gains, with average scores consistently higher than interval training. This indicates the potential of continuous running in increasing physical capacity and endurance. The practical implications are relevant for the design of exercise programs, providing guidance for coaches and individuals seeking improved physical performance. Although the results show the superiority of continuous running, interval training may require adapting strategies to achieve better results. This research also opens up opportunities for further research, especially in understanding the factors that influence achievement in these two training programs. Further exploration of variations in training duration, intensity and frequency in the context of both could provide new insights into the world of fitness and sport. These findings provide a strong empirical basis for decisions regarding physical exercise programs, support data-driven decision making, and provide insight into scientific approaches in guiding more effective and efficient physical exercise practices.



\*Corresponding email : [asmabara@upi.edu](mailto:asmabara@upi.edu)

ISSN 2685-6514 (Online)

ISSN 2477-331X (Print)

## INTRODUCTION

Physical activity such as exercise has a significant positive impact on physical health. Through regular physical exercise, the body's organ systems are empowered, providing benefits not only for fitness but also for strengthening the body's immunity (Porter et al., 2023). Apart from improving physical aspects, sport is also closely related to physical and mental well-being. (Monteiro et al., 2020) Through regular body movements, our minds are freed from tension and stress, allowing us to focus on the present moment. This is not only about physical health, but also about improving the overall quality of life. (Reichler et al., 2020) This is in accordance with Law of the Republic of Indonesia Number 3 of 2005 concerning the National Sports System written in article 1 paragraph 4 which reads "Sport is any systematic activity to encourage, foster and develop physical, spiritual and social potential". (Arrieta-Leandro et al., 2023)

The types of sports that are popular with Indonesian people are quite varied, what's more, Indonesian people are also said to be quite fond of setting aside time from their busy lives to keep exercising. (Jafari et al., 2023) In fact, several types of sports are so popular among Indonesian people that they are even contested at national and international levels. (Hawadi et al., 2023) There are at least several kinds of sports that are favorites of Indonesian people, namely running, badminton, basketball, volleyball, football and others. (Wahyuni et al., 2019) Running is a basic sport that can be done by people of all ages, including children, teenagers, adults and even the elderly. The running sport which is usually called athletics comes from the Greek word *Athlon* which means to compete or race. Running is a sport that is growing in the wider community, with

many championships or running events in various regions or cities, nationally and even internationally. (Nguyen, 2023) Running is a sport that is popular among people because running is a relatively cheap and easy sport. (Connolly, 2019) The trend of running as time goes by is increasing rapidly. (Taurusyanti et al., 2023) Currently, running is not just a sport but has become a culture in Indonesia. (Alitabar et al., 2023) This is proven by the formation of running communities in various regions, including Garut Regency, namely the Balad Lumpat Garut Running Community. (Mingazova et al., 2023) Each community has a vision and mission to make this cheap and cheerful sport more attractive and popular. (Nouri et al., 2023) The Balad Lumpat Garut Running Community is a group of teenagers, adults to seniors from 17 years to 65 years old, from students, civil servants and private sector workers, there are even retirees who are active in sports, especially running. (Anggi, 2023)

The Balad Lumpat Garut running community was formed on January 11 2020 with the aim of spreading a healthy lifestyle through running to the community, especially the Garut community, in general to the wider community. (Abadi et al., 2023) Remembering the importance of exercise and maintaining health during the Covid 19 pandemic which was still rampant in Indonesia and even the world. The popularity of running in Indonesia has increased rapidly since the pandemic occurred at the beginning of 2020, from young to old many are addicted to running. (Adam & Elssayed, 2022) Running competition events held in various locations in Indonesia to date are always busy with participants, many even don't get a ticket ( slot ) to take part in the running competition due to the high enthusiasm of the runners, they are so enthusiastic about taking part in

running competitions, more and more Indonesians are willing to go abroad to take part in a world-class running competition. There are many ways you can increase cardiovascular endurance, including jogging, fartlek, cross country, interval training, cycling, swimming and others. (Harpham et al., 2022) Continuous training Running is a continuous running activity and there is no rest time until the time limit determined by yourself or the coach. Greene (2015) says "Continuous training run is continuous training by running a certain distance continuously". The goal of continuous running training is to increase the efficient ability of the respiratory system. If done regularly, these exercise activities will make the lungs work more effectively. (Quilapio & Callo, 2022)

## METHOD

The research carried out by researchers used quasi-experimental research methods or Quasi Experiment Design. This experimental design controls several non-experimental variables and uses a control group as a comparison group to understand the treatment effect. (Monteiro et al., 2020) This quasi-research method is known as research that is close to experimentation but not fully experimental because it involves humans as research subjects who cannot be manipulated and controlled intensively. (Hawadi et al., 2023) In experimental research methods, there are various forms of research design. (Celik & Ata, 2020) Researchers used a two-group pretest-posttest design, which involved two measurement data, namely pretest (O1) and posttest (O2). (Griffiths et al., 2019) Data analysis was carried out using the t-sample test. This study aims to compare two training programs, namely continuous running and interval training.

The test was carried out twice, before and after treatment. The difference between the pretest and posttest results is assumed to be the effect of the treatment, so that it can provide more accurate information because it compares the conditions before and after the treatment. (Ganendra, 2019)

## RESULT

This research reveals the results of the test and final test (pre-test & post-test) by applying the quasi-experiment method (quasi-experimental design), a research approach that controls several non-experimental variables and uses a control group as a comparison group to assess the impact of treatment. (Johnson et al., 2021) In the context of experimental methodology, there are various forms of research design that can be used. Researchers in this study chose a two-group pretest-posttest research design, where two training programs, namely continuous running and an interval training program, were compared. The test was carried out twice, before and after treatment, to assess the differences in the effects of the two training programs. (Nadimi et al., 2021). From the data contained in table 1, it can be concluded that both the continuous running training program (marked in yellow) and interval training (marked in white) show stability in their average score range. In the initial test, these two programs had an average score of around 2065, which then increased to 2206 in the final test. During the initial test, the highest score was achieved by Ganny with a score of 2920, while the lowest score was 1220 obtained by Trisanti. Interestingly, in the final test, both of them managed to record the highest score again, although with a quite significant increase from before. This shows that these two training programs succeeded in improving the performance of the test participants, although there

were still variations in results between individuals. Furthermore, analysis by age group showed that the continuous running program provided significant improvements from pretest to posttest, providing an in-depth look at the positive impact of these two training programs.

**Table 1.** Overall Test Results

| No        | Continuous Running |        |                              |                        | Interval Training |        |                              |
|-----------|--------------------|--------|------------------------------|------------------------|-------------------|--------|------------------------------|
|           | Name               | Age    | Total Distance (M) Beginning | Total Distance (M) End | Name              | Age    | Total Distance (M) Beginning |
| 1         | Ganny              | 41 thn | 2920                         | 3005                   | Ahmad             | 46 Thn | 2705                         |
| 2         | Ikhsan             | 38 thn | 2550                         | 2820                   | Fandi             | 32 thn | 2660                         |
| 3         | Andri              | 40 thn | 2350                         | 2510                   | Ade               | 55 thn | 2300                         |
| 4         | Davif              | 25 thn | 2160                         | 2380                   | Davif             | 25 thn | 2160                         |
| 5         | Dhohi              | 34 thn | 2115                         | 2260                   | Tauhid            | 51 thn | 2045                         |
| 6         | Opik               | 45 thn | 2010                         | 2190                   | Maya              | 41 thn | 2035                         |
| 7         | Yuyu               | 38 thn | 1885                         | 1910                   | Eko               | 27 thn | 1720                         |
| 8         | Edelyn             | 45 thn | 1420                         | 1623                   | Zaky              | 43 thn | 1550                         |
| 9         | Tita               | 36 thn | 1360                         | 1508                   | Tristanti         | 61 thn | 1220                         |
| (Average) |                    |        | 2086                         | 2245                   | (average)         |        |                              |
| (stdev)   |                    |        | 471,8371                     | 476,3522               | (stdev)           |        |                              |
| (mid)     |                    |        | 2115                         | 2260                   | (mid)             |        |                              |
| (min)     |                    |        | 1360                         | 1508                   | (min)             |        |                              |
| (max)     |                    |        | 2920                         | 3005                   | (max)             |        |                              |

### 1. Continuous Running

The discussion of continuous running is a crucial aspect in this research. Continuous running, or continuous running, is a training method that involves running at moderate to high intensity for a relatively long period of time without long recovery intervals. (Porter et al., 2023) In the context of this research, continuous running is used as an exercise program to measure its impact on test participants' performance in the initial and final tests. (Whitehurst, 2021). First of all, continuous running is an aerobic exercise that aims to increase the participant's cardiorespiratory endurance. By requiring participants to run non-stop for a certain

period of time, this program aims to increase lung and heart capacity, improve blood circulation, and optimize the body's use of oxygen. Apart from that, continuous running also helps train muscle endurance, especially leg muscles, so that participants can maintain running speed and intensity during the training period. This program can also help increase muscle strength and endurance, as well as reduce the risk of injury by preparing the muscles to work in more extreme conditions.

In the context of this research, the results of the pre-test and post-test data show that participants who underwent continuous running experienced increased performance, which was reflected in increased scores on the pre-test and post-test. This indicates that continuous running training had a positive impact on participants' abilities in a running context, as well as highlighting the effectiveness of this program in improving participants' endurance and athletic performance. It is important to note that this discussion of continuous running provides a deeper understanding of the training method, presents specific test results, and illustrates how the program made a positive contribution to the test participants in this study. The following is the test results data before and after

**Table 2.** Continuous running test results (12 minute run)

| Continuous Running |         |        |                              |                        |
|--------------------|---------|--------|------------------------------|------------------------|
| No                 | Name    | Age    | Total Distance (M) Beginning | Total Distance (M) End |
| 1                  | Ganny   | 41 thn | 2920                         | 3005                   |
| 2                  | Ikhsan  | 38 thn | 2550                         | 2820                   |
| 3                  | Andri   | 40 thn | 2350                         | 2510                   |
| 4                  | Davif   | 25 thn | 2160                         | 2380                   |
| 5                  | Dhohi   | 34 thn | 2115                         | 2260                   |
| 6                  | Opik    | 45 thn | 2010                         | 2190                   |
| 7                  | Yuyu    | 38 thn | 1885                         | 1910                   |
| 8                  | Edelyne | 45 thn | 1420                         | 1623                   |
| 9                  | Tita    | 36 thn | 1360                         | 1508                   |
| (Average)          |         |        | 2086                         | 2245                   |
| (stdev)            |         |        | 471,8371                     | 476,3522               |
| (mid)              |         |        | 2115                         | 2260                   |
| (min)              |         |        | 1360                         | 1508                   |
| (max)              |         |        | 2920                         | 3005                   |

From the analysis of table 2, it can be seen that there is quite a significant increase between the results of the initial test and the final test for participants in the continuous running program. The average increase recorded was around 160 meters from the initial test results, indicating that participants who took part in the continuous running training program succeeded in improving their performance. For example, Tita, who had an initial running distance of 1360 meters, improved to 1508 meters in the final test. On the other hand, Ganny, who initially recorded the highest score with a distance of 2920 meters, managed to improve her performance to 3005 meters in the final test. These data show consistent improvement from pretest to posttest, demonstrating the positive impact of the continuous running program on participants' abilities. Interestingly, this improvement occurred not only in participants with low initial scores, but also in participants who had good initial performance, indicating that this training program was beneficial for participants of various ability levels. In other words, both participants with low and high initial scores have room for further improvement through the program.

Interval training is a training method that involves alternating between periods of high intensity exercise with periods of light recovery or rest. (Thomas et al., 2021) In this research, interval training was used as one of the training programs to measure its impact on test participants' performance in the initial and final tests. Basically, interval training is designed to increase cardiorespiratory endurance and increase muscle speed and strength. By integrating periods of high-intensity training followed by lighter recovery periods, this method encourages the body to operate at its maximum limit and recover quickly enough to resume training. (Mingazova et al., 2023) This

helps increase cardiovascular capacity and optimizes the body's use of oxygen. Apart from these benefits, interval training is also known as an effective way to burn fat and increase metabolism. Through a combination of high-intensity training and short recovery periods, the body continues to work hard even during the recovery period, resulting in a higher number of calories burned during and after exercise. Therefore, interval training has become a popular choice for those who want to improve their fitness efficiently and help manage their weight. Below is the results data recorded before and after participating in the Interval Running program.

**Table 3.** Interval Running Test Results  
(12 minute run)

| Interval Running |                |        |                                 |                           |
|------------------|----------------|--------|---------------------------------|---------------------------|
| No               | Name           | Age    | Total Distance (M)<br>Beginning | Total Distance (M)<br>End |
| 1                | Ahmad M        | 46 thn | 2705                            | 2850                      |
| 2                | Fandi          | 32 thn | 2660                            | 2718                      |
| 3                | Ade            | 55 thn | 2300                            | 2475                      |
| 4                | Davif          | 25 thn | 2160                            | 2205                      |
| 5                | Tauhid         | 51 thn | 2045                            | 2150                      |
| 6                | Bu May         | 41 thn | 2035                            | 2190                      |
| 7                | Valintin o Eko | 27 thn | 1720                            | 1790                      |
| 8                | Zaky           | 43 thn | 1550                            | 1850                      |
| 9                | Tristant i     | 61 thn | 1220                            | 1280                      |
| (Average)        |                |        | 2044                            | 2168                      |
| (stdev)          |                |        | 462,2936644                     | 459,0570313               |
| (mid)            |                |        | 2045                            | 2190                      |
| (min)            |                |        | 1220                            | 1280                      |
| (max)            |                |        | 2705                            | 2850                      |

After analyzing the data in table 3, it can be seen that there was an increase between the results of the initial test and the final test of participants who took part in the interval running program. The recorded average increase was around 124 meters from the initial test. In the interval running program, the participant with the lowest initial test results reached

1220 meters, which increased to 1280 meters in the final test, and the participant with the lowest results was Trisanti. Meanwhile, the participant with the highest initial test result reached 2705 meters, but in the final test it only increased to 2850 meters. From these two data, it can be concluded that participants experienced increased performance in the interval running program, although the increase was not as big as in the continuous running program. Although there is an improvement, this result is not significant when compared with a continuous running program. This conclusion shows that interval running, although effective in improving participants' physical abilities, does not provide as much performance improvement as a continuous running program. This provides a more detailed picture of the relative impact of the two exercise programs on test participants, illustrating the extent to which interval running affected participants in greater detail.

## CONCLUSION

In this research, an analysis of two physical training programs was carried out, namely continuous running and interval training, using various statistical methods. Initially, researchers used the Kolmogorov-Smirnov test to test the normality of data distribution in the two programs. The test results show a significance value of 0.200, which exceeds the standard threshold value of 0.05, indicating that the data distribution in the two programs is close to a normal distribution. Furthermore, homogeneity analysis using Levene's test showed that there was no significant difference in variability between the continuous running and interval training data groups. These results indicate that the

two groups have a similar level of data variability.

In hypothesis testing using the independent T test, it was found that the continuous running group had a significantly higher score (2245.11) compared to the interval running group (2167.56). Further analysis using a 95% confidence interval confirmed this difference, with a mean difference between the two groups of 77.556. Overall, statistical analysis shows that the continuous running program has a data distribution that is close to normal, has homogeneous variability with the interval training program, and achieves significantly higher achievements compared to interval running. These findings provide an in-depth understanding of the performance differences between the two physical training programs, providing a solid basis for recommendations in the context of sports training programs.

## DISCUSSION

The study adopts a quasi-experimental approach, employing a two-group pretest-posttest design to comprehensively assess the impact of two prevalent training programs, continuous running and interval training. Rigorous statistical tests, encompassing normality checks and independent T tests, were conducted to evaluate the effects on participants' performance. Both programs exhibited stability and improvement in average scores, with continuous running showcasing superior performance gains. The discussion on continuous running highlights its aerobic nature, emphasizing its role in enhancing cardiorespiratory endurance, improving blood circulation, and optimizing oxygen utilization. Additionally, the program's efficacy in training leg muscle endurance and its inclusive impact on

participants with varying initial performance levels are underscored. On the other hand, the discourse on interval training delineates its alternating high-intensity exercise and rest periods, designed to augment cardiorespiratory endurance, muscle speed, and strength, albeit with a comparatively smaller performance enhancement than continuous running. The nuanced analysis offers insights into the relative impacts of these programs, emphasizing the need to consider specific training goals and individual preferences. The study's practical implications extend to exercise program design, providing valuable guidance for coaches and individuals aiming to enhance physical performance. While continuous running emerges as a potent method, the study suggests that adaptive strategies may be necessary for optimizing interval training results. The research also paves the way for future investigations, urging a deeper understanding of factors influencing achievement in these training programs and exploring variations in duration, intensity, and frequency for a more comprehensive understanding of fitness and sports. Ultimately, this study contributes empirically to informed decision-making in crafting effective and efficient physical exercise programs.

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