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The Influence of the Base Aerobic Running Training Method in Facing The Physical Fitness Test in the Indonesian National Police Recruitment Selection

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ABSTRACT

Physical fitness is a fundamental determinant of health and physical performance, particularly in professions requiring high levels of physical endurance such as the military and police. Aerobic-based training plays a crucial role in enhancing cardiorespiratory capacity and sustaining physical performance under demanding conditions. In Indonesia, the physical fitness test—especially the 12-minute running test used to assess cardiovascular endurance—is a mandatory component of the Indonesian National Police (POLRI) recruitment selection process. However, many candidates experience difficulties in meeting the minimum standards, indicating the need for an effective and structured aerobic training approach. This study aimed to examine the effect of the Base Aerobic Running training method on physical performance in candidates preparing for the POLRI physical fitness test. An experimental method with a One Group Pretest–Posttest Design was employed. The sample consisted of 20 male candidates participating in a structured physical training program at Polres Garut. Cardiovascular endurance was measured using the 12-minute running test. The training intervention was conducted twice per week for 12 weeks following progressive overload principles. Data were analyzed using descriptive statistics and a paired sample t-test after confirming normal data distribution. The results demonstrated a substantial improvement in participants' running performance, with the mean distance increasing from 1840 meters at pretest to 2072 meters at posttest, yielding a gain of 232 meters. The paired t-test revealed a statistically significant difference between pretest and posttest scores ($t(19) = -27.771$; $p < 0.001$). In conclusion, the Base Aerobic Running training method has a significant positive effect on improving 12-minute running performance. These findings support the application of structured aerobic base training as an effective strategy for enhancing aerobic endurance and physical readiness among candidates in the Indonesian National Police recruitment selection.

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INTRODUCTION

Physical fitness is a key determinant of physical performance, work readiness, and individual resilience in facing the demands of high-intensity activities. In the context of professions with high operational risks—such as the military and police—physical fitness serves not only as an indicator of health but also as a prerequisite for duty readiness and personnel safety (Garg, 2025; Faria et al., 2024). Various studies have shown that cardiorespiratory capacity and aerobic endurance are strongly correlated with the ability to maintain physical performance under stress, fatigue, and unpredictable emergency situations (Valipour et al., 2021; Zhang et al., 2025).

In Indonesia, physical fitness is a crucial component in the selection process for recruiting members of the Indonesian National Police (POLRI). The physical fitness test—which includes a 12-minute run, push-ups, sit-ups, pull-ups, and swimming—is designed to objectively measure cardiovascular endurance, muscular strength, and functional capacity of prospective recruits (Susanto, 2020; Marins et al., 2019). However, empirical reports and field findings indicate that the 12-minute run is often the component with the highest failure rate, primarily due to participants' low aerobic endurance (Amaral & Santos, 2021; Ridwan, 2024).

The main identified problem is not simply low motivation or training volume, but rather the predominance of an unsystematic, instant-oriented training approach that lacks a foundation in exercise physiology. Many participants tend to rely on short bursts of high-intensity training without an adequate aerobic foundation, resulting in suboptimal physiological adaptations and even increasing the risk of excessive fatigue and injury (Bouley, 2023; Rodrigues Barbosa et al., 2024). This condition indicates an urgent need for a training model that is more structured, efficient, and in accordance with the specific demands of the Indonesian National Police physical fitness test.

Recent literature in coaching science and exercise physiology confirms that developing aerobic fitness is a key foundation in medium- to long-term training programs, particularly for individuals facing sustained endurance tests (Hellsten & Nyberg, 2015; Filipas et al., 2020). Aerobic-based training has been shown to improve cardiorespiratory efficiency, muscle oxidative capacity, and the body's ability to utilize oxygen more economically during physical activity (Valipour et al., 2021; Faria et al., 2024).

One approach that is gaining increasing attention is base aerobic running, a method of running at low to moderate intensity, for a relatively long duration, and performed consistently. This approach aims to build baseline aerobic capacity before individuals enter high-intensity or competition-specific training phases (Triyulianti et al., 2023). Empirical studies show that base aerobic running training can increase VO_2max, reduce submaximal heart rate, and improve biomechanical running efficiency, which directly impacts middle and long-distance running performance (Marsuna et al., 2024; Ramadhan, 2022).

In addition to physiological adaptations, recent research also highlights the contribution of sustained aerobic training to psychological aspects, such as mental toughness, stress regulation, and consistent performance under fatigue (Filipas et al., 2020; Bouley, 2023). In the context of the police profession, these aspects are

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particularly relevant given the demands of the job, which are not only physically demanding but also require emotional control and high levels of focus over long periods.

However, most research on base aerobic running still focuses on competitive athletes or the general population, such as recreational runners and sports students. Studies that specifically link this method to the context of security professional selection especially police physical fitness tests—are still relatively limited and have not been systematically integrated into physical training policies for prospective members (Amaral & Santos, 2021; Ridwan, 2024).

Based on the literature review, there are three main research gaps that require attention. First, although the effectiveness of aerobic training has been widely demonstrated, there is still a lack of research specifically examining base aerobic running as a preparation strategy for the 12-minute run test in the Indonesian National Police (POLRI) selection process. Most of the training programs used by selection participants are still generic and not based on contextual, empirical evaluation.

Second, previous research tends to emphasize the end result of increased VO_2max or running performance, but has not linked this to comprehensive physical readiness in multicomponent physical fitness tests. However, the ability to maintain performance in one test is significantly influenced by the body's physiological condition and recovery before and after other tests (Hellsten & Nyberg, 2015; Rodrigues Barbosa et al., 2024).

Third, there remains a gap between field training practices and modern periodization principles, which place an aerobic foundation as a crucial initial step. The dominance of high-intensity training without a strong aerobic base not only reduces adaptation efficiency but also potentially increases the risk of injury and chronic fatigue during selection preparation (Bouley, 2023; Zhang et al., 2025).

Therefore, empirical research is needed that explicitly tests the effect of the base aerobic running method on the physical readiness of prospective Indonesian National Police (POLRI) selection participants, while also bridging the gap between exercise physiology theory and fitness development practices in police institutions.

Based on the aforementioned research problems and gaps, the primary objective of this study is to analyze the effect of the base aerobic running training method on the physical readiness of prospective Indonesian National Police (POLRI) selection participants, particularly for the physical fitness test. More specifically, this study aims to evaluate the contribution of this training to improving aerobic endurance, running performance efficiency, and overall physical readiness in a series of fitness tests.

The novelty of this research lies in: the application and empirical testing of the base aerobic running method in the context of the Indonesian police selection process; a training approach that emphasizes an aerobic foundation as a preventative strategy against fatigue and injury during selection preparation; and the integration of physiological and practical perspectives as a basis for developing more efficient and evidence-based fitness development program recommendations.

Therefore, the results of this study are expected to not only enrich the scientific body of knowledge in the field of coaching and sports physiology, but also provide

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practical implications for coaches, police education institutions, and policymakers in designing training programs that are more adaptive to the demands of modern Indonesian National Police professionalism.

METHODS

Research Design and Approach

This study employed an experimental method with the aim of empirically testing the effect of a treatment on the dependent variable through controlled and systematic measurements. The experimental approach was chosen because it allowed researchers to identify a causal relationship between the Base Aerobic Running training method as the independent variable and the results of the physical fitness test as the dependent variable (Sugiyono, 2016; Creswell & Creswell, 2017). Theoretically, experimental designs are relevant in the study of exercise physiology because fitness adaptations are measurable and responsive to structured training stimuli (Bompa & Buzzichelli, 2019; Lesinski et al., 2016).

The research design employed was a One Group Pretest–Posttest Design, in which subjects were measured before and after an exercise intervention. Although without a control group, this design is considered adequate for observing performance changes due to the treatment in a homogeneous group within the same selection context (Shadish et al., 2015; Slocum et al., 2022). This design is widely used in applied fitness research, particularly in limited populations such as prospective members of security institutions, with the goal of evaluating the effectiveness of exercise programs in a practical and contextual manner (Amaral & Santos, 2021; Bouley, 2023).

Population and Sample

The study population included all prospective participants in the 2025 Indonesian National Police recruitment selection process who participated in a structured physical training program at the Garut Police Department. From this population, a sample of 20 male participants was selected using a purposive sampling technique. This technique was chosen to ensure that the subjects possessed characteristics relevant to the research objectives and met the initial physical readiness standards (Etikan et al., 2016).

Inclusion criteria included: (1) age 17–20 years, (2) minimum height 165 cm, (3) declared healthy and free from cardiovascular disorders or musculoskeletal injuries based on the results of a Medical Check-Up (MCU), (4) actively participating in the physical training program, and (5) willing to participate in the entire study by signing an informed consent. The establishment of these criteria is in line with the recommendations of fitness research in professional selection populations to minimize biological bias and increase internal validity (Marins et al., 2019; Zhang et al., 2025).

Research Instruments

The primary instrument used was the 12-minute run test (Cooper Test) as an indicator of cardiovascular endurance. This test was chosen because it is the standard instrument in the Indonesian National Police Physical Fitness Test and has high validity

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and reliability in estimating aerobic capacity and VO_2max (Cooper, 2013; Valipour et al., 2021). The use of the 12-minute run test is also practically relevant because it reflects the functional demands of the field, which require the ability to maintain continuous activity for a specified duration (Faria et al., 2024).

The test was conducted according to standard fitness procedures, including dividing participants into groups, a standardized warm-up, a starting signal from an officer, a 12-minute run along the track, periodic time information, and termination of the test using a long whistle. This standardization of procedures aimed to reduce non-treatment variation that could affect measurement results (Mishra et al., 2019).

Research Procedures and Treatments

The study was conducted in three main stages. The preparation phase was conducted in the first week, including technical coordination with the examiner, a health check, and a pretest to measure the participants' initial fitness level. The pretest data served as a baseline for evaluating performance changes resulting from the intervention (Field, 2024).

The treatment phase lasted from weeks 2 to 12, consisting of a Base Aerobic Running training program performed twice per week. The program was structured based on the principles of progressive overload and aerobic periodization, which emphasize gradual physiological adaptation without causing excessive fatigue (Bompa & Buzzichelli, 2019; Hellsten & Nyberg, 2015).

The training phase details are as follows: Adaptation Phase (weeks 2–4): duration 30–35 minutes, intensity ±65% HRmax; Strengthening Phase (weeks 5–6): duration ±45 minutes, intensity ±70% HRmax; and Consolidation Phase (weeks 7–12): duration up to 60 minutes, intensity ±75% HRmax.

Determining exercise intensity was based on the concept of aerobic heart rate zones and the Karvonen formula, which have been shown to be effective in improving cardiovascular efficiency and muscle oxidative capacity (Karvonen & Vuorimaa, 1988; Ramadhan, 2022; Marsuna et al., 2024).

To maintain internal validity, strict controls were implemented for confounding variables. Exercises were conducted at the same time (7:00 a.m. Western Indonesian Time) to minimize the influence of temperature and circadian rhythms. Exercise intensity was monitored using a heart rate monitor or manual pulse retrieval, and attendance and exercise tolerance were recorded for each session. All subjects received identical treatment to ensure consistency of the training stimulus (Slocum et al., 2022; Rodrigues Barbosa et al., 2024).

The final stage was conducted at week 13 with a posttest using a 12-minute run test using the same procedure as the pretest, allowing comparison of results to directly reflect the effects of the intervention.

Data Analysis Techniques

Data analysis began with descriptive statistics to describe the characteristics of the data, including the mean, standard deviation, minimum, and maximum values of the 12-minute run test results for the pretest and posttest. A normality test (Shapiro–Wilk or

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Kolmogorov-Smirnov) was then performed to ensure the data distribution met parametric statistical assumptions (Mishra et al., 2019).

Hypothesis testing was conducted using a Paired Sample T-Test to compare the mean differences in test results before and after treatment. This test was chosen because it is appropriate for paired designs and sensitive in detecting changes in performance due to training interventions (Warne, 2020). All statistical analyses were performed using IBM SPSS Statistics, with a significance level set at $\alpha = 0.05$ to ensure accurate causal inferences between the independent and dependent variables (Field, 2024).

RESULTS AND DISCUSSION

Result

The following descriptive statistical analysis presents a comprehensive overview of changes before and after the intervention. A comparison of pre-test and post-test results shows a positive and consistent trend of improvement in endurance performance. This is further reflected in the following summary of descriptive statistical results:

Table 1.
Descriptive Statistics of 12-Minute Run Test Results

Variabel	N	Mean (m)	Std. Deviation	Minimum	Maximum
Pre-test	20	1840	84.2	1700	1980
Post-test	20	2072	97.5	1860	2250
Gain (Post-Pre)	20	232	37.36	160	320

The results of the descriptive statistical analysis showed an improvement in the 12-minute run physical fitness test results after the treatment. The average 12-minute run pre-test results were lower than the post-test results, indicating an improvement in the students' cardiorespiratory endurance after participating in the learning or training program.

Normality Test Results

Before conducting the hypothesis testing, a prerequisite analysis test, namely a normality test, was conducted to determine whether the research data were normally distributed. The normality test in this study used the Shapiro-Wilk technique due to the relatively small sample size (N=20). The basis for making decisions in the normality test is that if the significance value (Sig.) is greater than 0.05 ($p > 0.05$), the data are considered normally distributed. The results of the normality test are presented in the following table:

Table 2.
Results of Normality Tests

	Shapiro-Wilk		
	Statistic	df	Sig.
Pre_test	.982	20	.957
Post_test	.967	20	.700
Gain	.963	20	.605

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Data normality was tested using the Shapiro-Wilk test because the sample size was less than 50 people. The test results showed that the pre-test data (p = 0.957), post-test (p = 0.700), and the gain or difference between the post-test and pre-test (p = 0.605) had a significance value greater than 0.05. Thus, it can be concluded that all data were normally distributed, thus meeting the assumptions for parametric statistical analysis.

Hypothesis Test Results

After confirming the data were normally distributed using the Shapiro-Wilk test, the final step in the data analysis series was to conduct a hypothesis test. This hypothesis test was conducted to determine whether there was a significant effect of base aerobic running training on improving 12-minute run test results. The basis for decision making is if the Sig. (2-tailed) value is < 0.05, then Ha is accepted. Next, the results of the hypothesis test are presented as follows.

Table 3.
Paired Sample T-Test Results

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pre_test - Post_test	-232.000	37.360	8.354	-249.485	-214.515	-27.771	19	.000

Based on the results of the Paired Sample t-test, the average difference between the pre-test and post-test was -232 meters. The calculated t-value was t(19) = -27.771 with a significance level of p = 0.000 (p < 0.05). The 95% confidence interval ranged from -249.485 to -214.515, all of which were below zero. These results indicate a significant difference between the pre-test and post-test results for the 12-minute run, with the post-test results being higher than the pre-test. Thus, the treatment provided was proven to have a significant effect on improving physical fitness.

The results of the Paired Sample T-Test showed a significance value (Sig. 2-tailed) of p < 0.001 (less than 0.05). Thus, H0 is rejected and Ha is accepted, so it can be concluded that there is a significant difference between the results of the 12-minute running test before and after the training treatment. The average distance traveled increased from 1840 meters to 2072 meters, with an increase of 232 meters, which indicates an increase in running endurance performance after the implementation of the training program.

Discussion

The results of this study indicate that a structured Base Aerobic Running program, implemented twice per week for 11 weeks (weeks 2 to 12), positively contributed to improving the aerobic endurance performance of the selected participants. Training intensities in the range of 65%–75% HRmax fall within the moderate-intensity aerobic training category, which has consistently been reported to be effective in improving cardiorespiratory fitness when performed continuously and progressively (Seo et al., 2021; Valipour et al., 2021). These findings reinforce the view that developing an aerobic foundation is an essential stage in physical development before entering high-intensity or task-specific training (Hellsten & Nyberg, 2015; Bouley, 2023).

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Physiologically, the improvements in 12-minute run performance observed in this study can be explained by adaptations in the cardiovascular and metabolic systems resulting from moderate-intensity aerobic training. Training in the aerobic zone triggers an increase in cardiac stroke volume, myocardial efficiency, and capillary density and oxidative enzyme activity in skeletal muscle (Hofmann & Tschakert, 2011; Faria et al., 2024). These adaptations contribute to an increased body capacity to transport and utilize oxygen more economically, enabling participants to maintain a more stable running pace for 12 minutes without experiencing premature fatigue.

Furthermore, the progressive training approach—from adaptation to stabilization—aligns with modern periodization principles, which emphasize gradually increasing training load to maximize adaptation and minimize the risk of overtraining (Bompa & Buzzichelli, 2019; Lesinski et al., 2016). In the context of physical selection, this approach is crucial because prospective participants are not only required to achieve peak performance but also to maintain their physical condition to be ready for a series of other fitness tests. This supports the findings of Rodrigues Barbosa et al. (2024) who stated that a strong aerobic foundation plays a crucial role in accelerating recovery and maintaining consistent performance on sequential physical tests.

From a practical perspective, participants' average distance exceeding 2,000 meters on the 12-minute run test indicates increased readiness to meet the physical fitness test standards for the Indonesian National Police selection process. The 12-minute run test is a widely used field instrument to evaluate cardiorespiratory endurance due to its strong correlation with functional aerobic capacity (Cooper, 2013; Amaral & Santos, 2021). Therefore, the increase in distance traveled after the intervention can be interpreted as an indicator of improved aerobic work capacity, directly relevant to the demands of police selection.

These findings also strengthen the argument that Base Aerobic Running training is not simply a method for improving general fitness, but can serve as an applicable and contextualized basic aerobic training strategy for prospective police officers. Unlike high-intensity training approaches often adopted immediately, basic aerobic training provides a more stable and sustainable adaptive stimulus and has the potential to reduce the risk of injury from uncontrolled spikes in training load (Bouley, 2023; Zhang et al., 2025). Therefore, the results of this study support the literature's recommendation that strengthening aerobic capacity is a key foundation in physical development for security professionals.

However, interpretation of this study's findings requires considering several methodological limitations. First, the use of a One Group Pretest–Posttest design without a control group limits the study's ability to isolate the absolute effects of the intervention. The performance improvements observed could potentially be influenced by external factors, such as the effect of habituation to the test or increased motivation during the training period (Shadish et al., 2015; Slocum et al., 2022). Second, the relatively small sample size (N = 20) and homogeneous subject characteristics—limited to male participants aged 17–20 from a single training location—limit the generalizability of the findings to a broader and more diverse population of potential selection candidates.

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Third, the measurements in this study focused on 12-minute run performance without direct physiological indicators, such as estimated VO_2max, recovery heart rate, or heart rate variability (HRV). These indicators could provide a more comprehensive picture of the physiological adaptation mechanisms underlying performance improvements (Mishra et al., 2019; Valipour et al., 2021). Fourth, external variables such as nutritional intake, sleep quality, additional physical activity outside the training program, and environmental conditions were not fully controlled, potentially influencing individual responses to the intervention (Field, 2024). Fifth, this study did not evaluate the sustainability of the training effects through follow-up measurements, so the long-term stability of adaptations cannot be confirmed.

Based on these limitations, further research is recommended to employ a more robust experimental design, such as a randomized controlled trial, involving a control group and a larger, more heterogeneous sample size. The addition of supporting physiological measurements and medium- to long-term follow-up evaluations are also recommended to enrich understanding of the effectiveness and sustainability of the Base Aerobic Running method in the context of police physical selection. Thus, the development of a fitness development model for prospective Indonesian National Police (POLRI) members can be increasingly evidence-based and aligned with the demands of modern professionalism.

CONCLUSION

This study proves that Base Aerobic Running training is effective in improving the performance of the 12-minute running test in prospective Indonesian National Police (POLRI) selection participants. The average distance traveled increased from 1840 m (pre-test) to 2072 m (post-test) with a gain of 232 m; the data were normally distributed (Shapiro–Wilk, $p > 0.05$) and the Paired Sample t-test showed a significant increase, $t(19) = -27.771$; $p < 0.001$. These findings indicate that moderate-intensity aerobic training (65%–75% HRmax) carried out progressively for 11 weeks is effective as an endurance training program for fitness test readiness. Limitations of the study include the design without a control group, a small and homogeneous sample (20 male participants, one location), the absence of direct physiological measurements, as well as limited control of external factors and the absence of follow-up. Future research is recommended to add a control group, expand sample characteristics, include physiological indicators, and conduct a post-intervention evaluation to assess long-term effects.

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