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The Effect of the Hill Jog–Stride Training Method on 5K Running Performance Among Non-Athlete Runners in the GB Runner Banjarbaru Community

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Abstract
This study aimed to determine the effect of the Hill Jogg-Stride training method on 5-km running performance among non-athlete runners in the GB Runner Banjarbaru community. The study employed a quantitative approach using a quasi-experimental method with a One Group Pretest–Posttest Design. The sample consisted of 24 non-athlete runners selected through purposive sampling. The training program was conducted over four weeks with three sessions per week, for a total of 12 training sessions. Data were collected through 5-km running tests conducted before (pre-test) and after (post-test) the training program. Data analysis began with the Shapiro–Wilk normality test and was followed by a paired-sample t-test at a significance level of 0.05. The normality test indicated that both the pre-test and post-test data were normally distributed, with significance values of 0.119 and 0.052, respectively. The hypothesis test yielded a significance value of 0.015 (< 0.05), indicating a statistically significant difference between the pre-test and post-test results. The average 5-km running time improved from 1,444 seconds (24 minutes 04 seconds) to 1,407 seconds (23 minutes 27 seconds), representing an average reduction of 37 seconds. These findings indicate that the Hill Jogg-Stride training method improved the 5-km running performance of non-athlete runners in the GB Runner Banjarbaru community.

Keywords: Hill Jogg-Stride, 5-Km Running Performance, Non-Athlete Runners, Running Training, Running Community.

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INTRODUCTION

Running is one of the most accessible forms of physical activity because it can be performed by individuals of different ages without requiring specialized equipment or dedicated facilities. It may take place on public roads, athletic tracks, open fields, or in public parks. Besides contributing to physical fitness, running is associated with psychological benefits, including reduced mental strain and improved concentration. As the sport has evolved, running events have been classified according to race distance and competition objectives into sprint, middle-distance, and long-distance categories. Each event places different physiological demands on the body, requiring training programs that correspond to the characteristics of the specific running discipline.

Over the past few years, long-distance running has gained wider public interest in Indonesia. Participation is no longer limited to competitive athletes, as recreational runners and members of community-based running groups have become increasingly involved in training sessions and organized races. Long-distance running generally refers to events covering distances of 3,000 meters or more, where runners are expected to maintain a steady pace from the start to the finish line. Among these events, the 5-kilometer (5 km) road race has become one of the most popular categories. Although shorter than other long-distance races, the 5 km event requires good cardiorespiratory endurance, strong lower-limb muscles, and economical running mechanics throughout the race. Both the 5 km road race and the 5,000-meter track event are frequently used as entry-level competitions before runners progress to longer events, such as the 10 km race, the 10,000-meter track race, the half marathon, and the full marathon.

The 5 km race attracts a broad range of participants because the distance offers a balance between challenge and accessibility. It is suitable for beginners, recreational runners, members of running communities, and individuals with previous racing experience. According to Bull *et al*. (2020), middle- and long-distance running are classified as moderate- to vigorous-intensity aerobic activities that contribute to improvements in physical fitness, cardiorespiratory endurance, stamina, and overall physical capacity. Achieving better performance in the 5 km event requires appropriate energy management during the race together with progressive training that matches an individual's physical condition. For this reason, improvements in 5 km running performance depend on a structured training program that incorporates exercise variations suited to the physiological demands of long-distance running.

Performance in long-distance running is influenced by multiple factors related to both physical condition and supporting aspects of training. Breathing technique, pacing strategy, nutritional intake, and psychological readiness all contribute to the results achieved during a race. A clear understanding of these factors enables runners to improve their performance while reducing the likelihood of excessive fatigue and sports-related injuries. For this reason, research on training methods is needed to provide a scientific basis for developing training programs that suit the characteristics and capabilities of individual runners.

Preliminary observations conducted within a running community in Banjarbaru revealed that improvements in 5 km performance among non-athlete runners have remained relatively limited. Although most community members participate in regular training sessions, their finishing times in 5 km races have shown little measurable progress. These findings

suggest that the current training approach has not yet produced the level of performance development expected by the runners.

Further observations indicated that the training routines commonly practiced by community members tend to be repetitive. Most participants regularly perform long-distance running sessions using similar intensity levels and training patterns across successive workouts. Such routines may slow physiological adaptation, making further gains in running performance more difficult to achieve. In addition, the gradual application of training principles has not been fully implemented, particularly with regard to progressive increases in training volume, adjustments in exercise intensity, and the inclusion of varied training methods throughout the training program.

Another issue identified during the preliminary observations relates to the mismatch between the training routines commonly performed and the physiological demands of 5 km racing. Most non-athlete runners devote a large proportion of their training to aerobic endurance, whereas speed development, lower-limb strength, and muscular stability receive comparatively less attention. According to Amirudin and Abdillah (2020), aerobic endurance, commonly expressed as VO_2max, refers to the capacity of the cardiovascular system—including the heart, blood vessels, and blood—together with the respiratory system to deliver oxygen to working muscles while removing metabolic by-products. When training is directed mainly toward aerobic endurance, physiological adaptation to exercise loads may occur more gradually, limiting improvements in 5 km running performance.

Another challenge observed within the community is the limited application of proper warm-up, stretching, and cool-down activities before and after training sessions. This situation may contribute to greater muscle fatigue following exercise, which can reduce the quality of subsequent training sessions. In addition, uphill running is rarely included in the weekly training routine, even though road races commonly feature courses with varying elevations where uphill sections demand greater muscular strength and energy expenditure than flat terrain. Consequently, runners require training that prepares the body for the physical demands encountered during actual competitions.

Previous studies have reported that uphill running training produces favorable adaptations in running performance. Commonly applied approaches include hill running and hill repeat training. Badaruddin *et al*. (2024) reported that an uphill running program conducted three times per week for four weeks produced significant improvements in participants' physical fitness. Similarly, Subur Fathoni *et al*. (2026) found that hill repeat training enhanced middle-distance running performance through improvements in lower-limb strength, aerobic

endurance, and running speed. Angreini (2023) also reported that uphill and downhill running exercises improved 1,500-meter race performance alongside gains in cardiovascular endurance. Comparable findings were presented by Sutrisno *et al*. (2025a), who concluded that a structured hill repeat program increased VO_2max, leading to better endurance capacity and improved performance in both middle- and long-distance running events.

Despite these findings, most previous investigations have focused on student or collegiate track and field athletes. Research involving recreational runners or members of community-based running groups remains relatively limited. Thuany *et al*. (2020) defined non-athletes as individuals who participate in sport primarily for physical fitness, health promotion, educational purposes, or recreation rather than competitive achievement. This condition indicates that further studies are needed to identify training approaches that correspond to the characteristics and training needs of non-athlete runners.

One training approach that may address these needs is the Hill Jogg-Stride method, which combines light-intensity jogging with controlled stride running on an uphill course. This approach is expected to improve several physical components simultaneously, including running speed, endurance, lower-limb strength, running mechanics, and aerobic capacity as represented by VO_2max. Furthermore, this type of training resembles the elevation profile commonly encountered in road races, allowing runners to adapt to conditions that are closer to those experienced during competition.

Based on these considerations, this study aims to examine the effect of the Hill Jogg-Stride training method on 5 km running performance among non-athlete runners who are members of the GB Runner Banjarbaru community. The findings are expected to provide scientific references for designing training programs with greater variation, progressive organization, and closer alignment with the physiological demands of long-distance running. In addition, the results may offer an alternative training approach for addressing performance plateaus experienced by community runners, thereby supporting improvements in physical capacity, running technique, and 5 km race performance.

METHOD

This study employed a quantitative approach using a quasi-experimental method with a One-Group Pretest–Posttest Design. The study involved a single group of non-athlete runners whose 5 km running performance was assessed before and after participation in a Hill Jog–Stride training program. The research was conducted in Banjarbaru over a four-week period, with training sessions held three times each week. Participants were selected through purposive

sampling from members of the GB Runner Banjarbaru community who met the predetermined inclusion criteria. Eligible participants were required to be actively involved in community training, capable of completing a 5 km run, willing to participate throughout the entire training program, within the specified age range, and free from injuries during the study period. The training program consisted of three phases: a warm-up, the main exercise session, and a cool-down. The main training session combined light-intensity jogging with controlled stride running on an uphill course. The program was developed according to the principles of progressive overload and adequate recovery throughout the intervention period. In this study, the independent variable was the Hill Jog–Stride training method, while the dependent variable was 5 km running performance, represented by participants' completion time. Data were collected through a 5,000-meter running test administered before and after the intervention on the same predetermined course. Running time was recorded using a stopwatch. Prior to hypothesis testing, the data were examined using the Shapiro–Wilk normality test. Differences between pretest and posttest performance were then analyzed using a paired-samples *t*-test with a significance level of 0.05 to determine whether the Hill Jog–Stride training program produced changes in participants' 5 km running performance.

RESULTS AND DISCUSSION

Result

A normality test was conducted to determine whether the data satisfied the assumptions required for parametric statistical analysis. The Shapiro–Wilk test was selected because the study involved 24 participants ($n < 50$). Data were considered normally distributed when the significance value (Sig.) exceeded 0.05, whereas a significance value below 0.05 indicated a departure from normality.

Table 1. Analysis Assumption Test

Pretest Posttest Test of Normality

	Kolmogorov- Smirnov			***Shapiro-Wilk***		
	Statistic	***df***	***Sig.***	***Statistic***	***df***	***Sig.***
Pretest	0,154	24	0,145	0,934	24	0,119
Posttest	0,172	24	0,064	0,918	24	0,052

The results of the Shapiro–Wilk test showed significance values of 0.119 for the pretest data and 0.052 for the posttest data (Table 1). Since both values were greater than 0.05, the pretest and posttest data were regarded as normally distributed. These findings indicated that

the assumption of normality was satisfied, allowing the analysis to proceed with a paired-samples *t*-test to examine the effect of the Hill Jog–Stride training method on 5 km running performance among non-athlete runners.

Following confirmation of data normality, hypothesis testing was performed using a paired-samples *t*-test. This analysis was carried out to determine whether a statistically significant difference existed in the 5 km completion times of non-athlete runners from the GB Runner Banjarbaru community before and after participation in the Hill Jog–Stride training program.

Before presenting the results of the paired-samples *t*-test, descriptive statistics from the paired samples analysis were examined to summarize the characteristics of the data. This analysis provided the mean, sample size (N), standard deviation, and standard error of the mean for the pretest and posttest measurements of 5 km running time.

Table 2. Paired Samples Statistics

Paired Samples Statistics					
		Mean	*N*	*Std. Deviation*	*Std. Error Mean*
Pair 1	*Pretest*	1444	24	213	43,526
	Posttest	1407	24	208	42,510

As presented in Table 2, the mean pretest completion time was 1,444 seconds with a standard deviation of 213 seconds. After the training program, the mean completion time decreased to 1,407 seconds with a standard deviation of 208 seconds. All 24 participants completed both the pretest and posttest assessments. The descriptive results indicate an average reduction of 37 seconds in 5 km completion time following the Hill Jog–Stride training program. A shorter completion time represents an improvement in running performance. The standard deviation values recorded before and after the intervention were comparable, indicating that the variability of participants' performances remained relatively stable across the two measurements.

Although the descriptive statistics indicate an improvement in running performance after the intervention, these results alone cannot determine whether the observed difference is statistically significant. Therefore, the analysis was continued using a paired-samples *t*-test to evaluate whether the difference between the pretest and posttest completion times was statistically significant.

Table 3. Paired Samples Test

Paired Samples Test									
		Paired Differance							*Significance*
					95% Confiance Interval of the Differance				
		Mean	*Std.Deviation*	*Std. Error Mean*	*Lower*	*Upper*	*t*	*df*	*Sig. (2-tailed)*
Pair 1	*Pretest-Posttest*	37	70	14,266	7,988	67,012	2,629	23	0,015

Table 3 presents the results of the paired-samples *t*-test. The analysis showed a mean difference of 37 seconds between the pretest and posttest 5 km completion times. This finding indicates that participants completed the 5 km run in a shorter time after completing the Hill Jog–Stride training program than they did before the intervention. The reduction in completion time indicates an improvement in running performance among the participants.

The paired-samples *t*-test produced a *t* value of 2.629 with 23 degrees of freedom ($df = 23$). The two-tailed significance value was 0.015. Since this value was below the predetermined significance level of 0.05 ($0.015 < 0.05$), the null hypothesis (H_0) was rejected, and the alternative hypothesis (H_1) was accepted. These results indicate a statistically significant difference between the pretest and posttest 5 km completion times following participation in the Hill Jog–Stride training program.

The 95% confidence interval for the mean difference ranged from 7.988 to 67.012 seconds. Because both confidence limits were above zero, the analysis supports the presence of a measurable reduction in completion time after the training intervention. These findings indicate that the observed improvement was supported by statistical evidence, suggesting that the Hill Jog–Stride training method contributed to enhanced 5 km running performance among non-athlete members of the GB Runner Banjarbaru community.

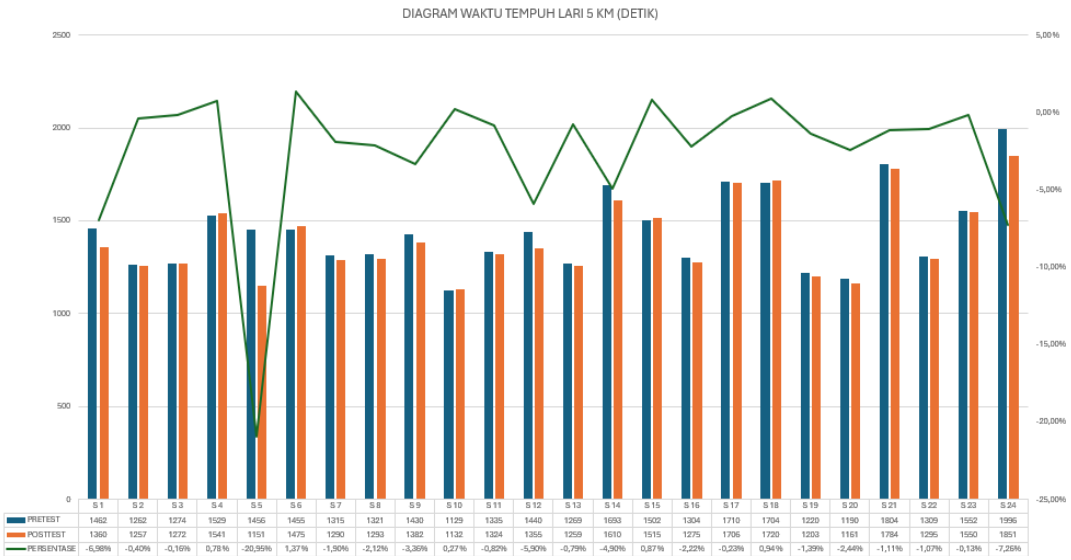


Figure 1. 5 km Completion Time Distribution

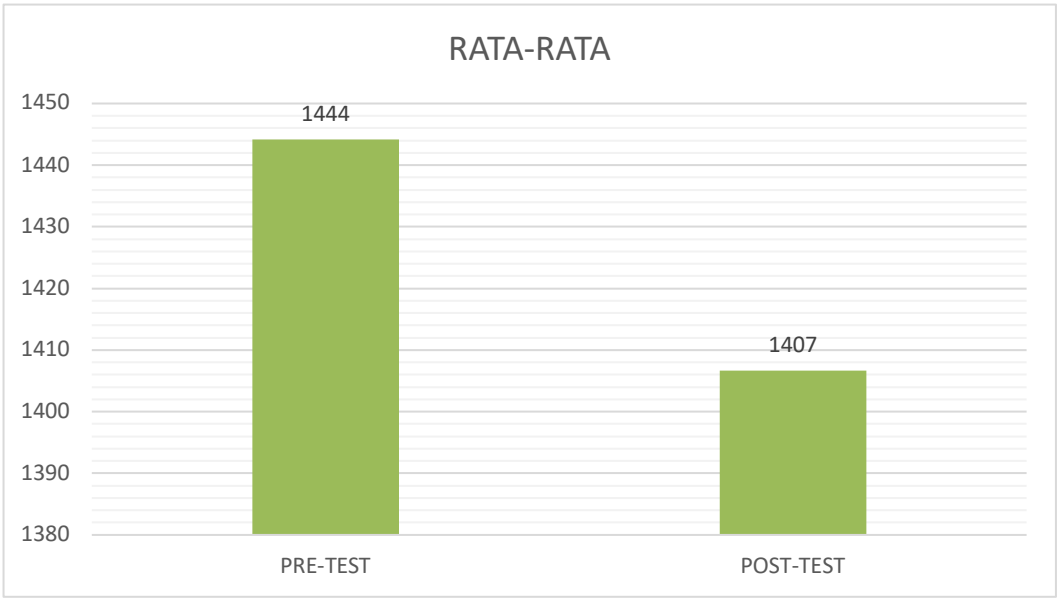


Figure 2. Mean 5 km Completion Time

Figures 2 and 3 illustrate the individual completion times and the mean completion times recorded before and after the intervention. The average pretest completion time was 1,444 seconds (24 minutes and 4 seconds), whereas the average posttest completion time decreased to 1,407 seconds (23 minutes and 27 seconds). This represents an average improvement of 37 seconds following completion of the training program. The reduction in completion time indicates that participants were able to complete the 5 km distance more quickly after participating in the Hill Jog–Stride training sessions.

Based on the statistical findings, the null hypothesis (H_0) was rejected and the alternative hypothesis (H_1) was accepted. These results demonstrate that the Hill Jog–Stride training method produced a statistically significant improvement in 5 km running performance among non-athlete runners from the GB Runner Banjarbaru community. Therefore, the research objective was achieved, and the proposed research question was addressed. The intervention, consisting of 12 training sessions conducted three times per week, resulted in an average reduction of 37 seconds in 5 km completion time. These findings suggest that the Hill Jog–Stride training method may be considered as a training option for improving 5 km running performance among non-athlete runners.

Discussion

This study examined the effect of the Hill Jog–Stride training method on 5 km running performance among non-athlete members of the GB Runner Banjarbaru community. The results of the paired-samples *t*-test yielded a significance value of 0.015, which was below the predetermined significance level of 0.05. Consequently, the null hypothesis (H_0) was rejected, and the alternative hypothesis (H_1) was accepted. These findings indicate a statistically significant difference between the pretest and posttest measurements following participation in the training program. The improvement was also reflected in the mean 5 km completion time, which decreased from 1,444 seconds to 1,407 seconds, representing an average reduction of 37 seconds. These findings indicate that the study successfully achieved its objective of evaluating the influence of the Hill Jog–Stride training method on 5 km running performance among non-athlete runners.

The findings also address the research question regarding the contribution of the Hill Jog–Stride training method to 5 km performance in members of the GB Runner Banjarbaru community. Following twelve training sessions, participants demonstrated faster completion times during the posttest than during the pretest. This reduction in running time indicates that participants completed the 5 km distance more quickly after completing the intervention. Based on these results, the Hill Jog–Stride method may be considered a suitable training approach for improving 5 km running performance among non-athlete runners.

The present findings are consistent with the training principles described by Bompa and Buzzichelli (2019). According to their framework, performance in endurance sports is influenced by the combined development of aerobic capacity, muscular strength, and movement technique through progressive and well-planned training. Improvements in physical performance occur gradually as the body adapts to changes in training volume, intensity, and

frequency. In the present study, the Hill Jog–Stride program was implemented over four weeks with three training sessions per week, providing participants with sufficient exposure to progressively increasing training loads throughout the intervention.

Bompa and Buzzichelli (2019) further explained that uphill running is one form of training capable of increasing lower-limb muscular strength because the inclined surface creates greater resistance during movement. Running uphill requires the leg muscles to generate higher propulsive forces to overcome gravity, resulting in greater muscular effort throughout each stride. Repeated exposure to these demands contributes to improvements in muscular strength, endurance, and muscle activation during running. At the same time, oxygen demand increases, stimulating adaptations within the cardiorespiratory system. These physiological responses are closely related to 5 km performance because the ability to sustain running speed over the entire race depends largely on aerobic endurance and lower-limb muscular strength.

Within the Hill Jog–Stride training method, the jog–stride component also contributes to improvements in running performance. Bompa and Buzzichelli (2019) explained that the transition from light jogging to stride running is intended to develop movement coordination, refine running mechanics, and improve neuromuscular readiness through short bouts of high-intensity movement. This approach allows the body to adapt to greater exercise demands while limiting excessive fatigue. Such adaptations help runners establish a more consistent stride pattern and achieve more economical movement during running. By combining uphill running with jog–stride exercises, the training program provides simultaneous stimulation for physical development and technical refinement, leading to better performance in the 5 km event.

From a physiological perspective, performance in a 5 km race is influenced by several key factors, including aerobic capacity (VO_2max), lactate threshold, running economy, and muscular strength. The Hill Jog–Stride program implemented in this study integrated light jogging with stride running on an uphill course, providing training stimuli that targeted these performance-related components. Uphill running promoted improvements in lower-limb muscular strength and cardiorespiratory function, whereas the jog–stride component supported better movement coordination and running technique. The combination of these training elements enabled participants to sustain their running pace with more economical energy use throughout the 5 km distance.

The findings of this study are consistent with previous research on uphill running. Badaruddin *et al*. (2024) reported that an uphill running program performed three times per week over four weeks produced significant improvements in participants' physical fitness.

These findings suggest that gains in physical fitness, particularly cardiorespiratory endurance, are associated with faster 5 km completion times. Similarly, Subur Fathoni *et al*. (2026) found that interval training performed on uphill terrain improved middle-distance running performance through increases in lower-limb muscular strength and aerobic capacity.

The present findings also correspond with those reported by Angreini and Endriani (2023), who concluded that uphill and downhill running training improved 1,500-meter race performance among student athletes affiliated with the Medan City Athletics Association. Although their study examined a different race distance, the results indicate that training on courses with varying elevations promotes physiological and biomechanical adaptations that contribute to improved running ability. Comparable evidence was reported by Sutrisno *et al*. (2025), who observed that uphill interval training increased VO_2max in middle-distance runners. Higher VO_2max values indicate greater aerobic capacity, which is widely recognized as one of the primary determinants of long-distance running performance.

Drawing upon the training principles proposed by Bompa and Buzzichelli (2019) together with evidence from previous studies, the findings of the present study indicate that the Hill Jog–Stride training method contributes to improved 5 km running performance among non-athlete members of the GB Runner Banjarbaru community. The observed improvements appear to be associated with gains in aerobic capacity, lower-limb muscular strength, and running technique resulting from physiological and neuromuscular adaptations developed throughout the training program. Based on these findings, the Hill Jog–Stride method may be considered a suitable training option for non-athlete runners seeking to improve their performance in the 5 km event.

Several limitations should be considered when interpreting the findings of this study. The research adopted a one-group pretest–posttest design without the inclusion of a control group, which limits the ability to conclude that the observed improvements resulted exclusively from the Hill Jog–Stride training program. In addition, the study involved only 24 participants, and this relatively limited sample may reduce the extent to which the findings can be generalized to other populations of non-athlete runners. Another limitation is the relatively short intervention period of four weeks, which may not be sufficient to examine the long-term effects of the training method.

Furthermore, participants' physical activities outside the prescribed training sessions were neither monitored nor standardized, creating the possibility that external activities influenced the results. The study also did not assess physiological indicators, including VO_2max, heart rate, and blood lactate threshold, which could have provided a more

comprehensive explanation of the mechanisms underlying the observed performance improvements. Future research should consider addressing these limitations by employing a controlled experimental design, recruiting a larger sample, extending the duration of the intervention, monitoring participants' activities outside the training program, and incorporating relevant physiological assessments.

CONCLUSION

The findings of this study indicate that the Hill Jog–Stride training method produced a statistically improvement in 5 km running performance among non-athlete members of the GB Runner Banjarbaru community. The training program, conducted over four weeks with a total of 12 sessions at a frequency of three sessions per week, improved participants' ability to complete the 5 km distance. This improvement was demonstrated by a reduction in completion time following the intervention. The paired-samples *t*-test yielded a significance value of 0.015 (< 0.05), leading to the rejection of the null hypothesis (H_0) and acceptance of the alternative hypothesis (H_1). The mean 5 km completion time decreased from 1,444 seconds (24 minutes and 4 seconds) during the pretest to 1,407 seconds (23 minutes and 27 seconds) during the posttest, representing an average improvement of 37 seconds. These findings indicate that participants achieved better running performance after completing the Hill Jog–Stride training program. Based on the results of this study, the Hill Jog–Stride training method may be considered a suitable training option for non-athlete runners seeking to improve their 5 km performance through a structured program that applies progressive training and follows established training principles.

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