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The Effect of Shuttle Run and Zig-Zag Run Exercises on Dribbling Agility in Football School Erla U-12 Students

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Abstract

Dribbling skills are one of the important basic techniques in football that are influenced by the physical condition of the player, especially agility. Based on preliminary observations, players' dribbling skills still need to be improved, especially in terms of dribbling speed and the ability to change direction when passing opponents. This study aims to determine the effect of shuttle run and zig-zag run exercises on increasing ball dribbling agility in Football School ERLA U-12 players in Larangankulon Village. This study uses an experimental method with a pretest-posttest design. The research subjects amounted to 20 Football School ERLA U-12 players who were divided into two groups, namely the shuttle run training group and the zig-zag run training group. The training program is carried out for 16 meetings with a frequency of three times a week. Data collection was carried out using a dribbling dexterity test, while data analysis used a Kolmogorov-Smirnov normality test and a pair sample t-test. The results showed that the two training methods had a significant influence on increasing the dribbling agility of players with a significance value of 0.000 ($p < 0.05$). The average increase in the shuttle running group was 0.639 seconds, while in the zig-zag running group it was 0.634 seconds. The results of the effect size analysis showed that both methods had a very large influence, but the zig-zag run exercise showed slightly higher effectiveness. Based on the results of the study, it can be concluded that shuttle run and zig-zag run exercises are effective in improving the dribbling agility of early age soccer players, with zig-zag run training as a more effective method.

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INTRODUCTION

Football is one of the most popular sports in the world played by various age groups, from children to professional athletes (Yu et al., 2025). The popularity of this sport can be seen not only from the number of players and the competitions it organizes, but also from the development of scientific research related to player performance and effective training methods (Yu et al., 2025). In the modern game of football, players are required to have physical, technical, tactical, and mental abilities that are integrated with each other to achieve optimal performance on the field. One of the very important aspects of the game of football is the mastery of basic techniques, since basic techniques are the main foundation in developing the skills of playing football (González-Fernández et al., 2024). Among these basic techniques, dribbling ability is one of the most important skills as it is often used in game situations to maintain possession, pass opponents, and create attack opportunities (Staiano et al., 2025).

Good dribbling skills are not only determined by technical skills alone, but are also influenced by the physical condition of the player. One of the components of physical condition that has an important role in supporting dribbling skills is agility. Agility is a person's ability to change the direction of body movement quickly and precisely without losing balance (Rodríguez et al., 2025) In the game of soccer, players are often faced with situations that demand a quick change of direction when dribbling to avoid the opponent's pressure or look for open spaces. Therefore, players who have a good level of agility tend to be able to dribble more effectively and efficiently (Pablo et al., 2024). Research shows that agility has a significant relationship with the dribbling ability of football players, so increased agility can contribute to improving the technical performance of players on the field (Yusuf et al., 2022).

Some previous studies have also shown that the ability to change direction is an important component in the performance of football players, especially in young age groups that are in the stage of developing motor skills (Pablo et al., 2024). Research on football academy players showed a positive relationship between agility and a player's dribbling ability ($r = 0.516$), which suggests that players with better agility levels tend to have more effective dribbling skills (Muhammad Feby Fakhriza & Permono, 2025). In addition, other research shows that structured agility training is able to significantly improve a player's dribbling skills after a training program is conducted for several weeks. The results of the study show that training that focuses on increasing agility can have a positive impact on improving technical skills in the game of football (Rizal et al., 2025).

Various studies have discussed efforts to improve the technical skills and performance of football players, especially in young players, there are still research gaps that need to be further researched. Some recent research in international journals shows that improving dribbling performance and player agility is often done through game-based training approaches such as small-sided play, court size modification, and core stability training that focuses on developing player coordination, balance, and body control (Rodríguez et al., 2025). This study specifically compares the effectiveness of a simple, structured form of directional change exercise using mostly the Illinois Agility Drill and T-Test Agility Drill, exercises such as shuttle run and zig-zag run to improve dribbling agility in still relatively limited early childhood football players (Rizal et al., 2025; Shibeshi, 2022; Yusuf et al., 2022). In fact, these two forms of training are the most frequently used methods in basic training programs because they are easy to implement, do not require complicated equipment, and focus on the ability to change direction which is an important component of dribbling on the (Martín-Moya et al., 2023) field. Other research shows that training programs that focus on the ability to change direction can significantly improve the movement performance of soccer players, especially in young players who need the development of motor skills and good coordination of movements (Pablo et al., 2024).

In the practice of football coaching, there are various forms of training that can be used to improve player agility, such as shuttle runs and zig-zag runs (Komang et al., 2023). Shuttle run training is a form of exercise that emphasizes the ability to move forward and backward quickly with repeated changes of direction within a specific trajectory. This pattern of movement involves rapid acceleration, deceleration, and change of direction so that it is very effective in improving the ability to change direction which is one of the main components of the agility of soccer players (Ramirez-Campillo et al., 2020). This exercise involves rapid acceleration and deceleration so that it can improve the ability to change direction which is an important component in the performance of soccer players (Ramirez-Campillo et al., 2020). Meanwhile,

the zig-zag run exercise is a form of agility training that is carried out with a pattern of rotating movements sequentially through several obstacles or cones. This movement pattern aims to train the player's ability to change the direction of body movement quickly and in a controlled manner so that it can improve the coordination, balance, and dribbling ability of football players. Research shows that zig-zag run training as a form of agility training is able to improve players' dribbling performance after being carried out in a certain training program (Yusuf et al., 2022). First, shuttle running exercises place more emphasis on changes in direction in a straight trajectory with alternating movements (Ramirez-Campillo et al., 2020). Second, the zig-zag run exercise emphasizes the ability to change direction laterally through the winding movement pattern of (Beato et al., 2023). Both forms of training theoretically have the potential to increase player agility which can ultimately support the improvement of dribbling skills in the game of (Ramirez-Campillo et al., 2020).

In the practice of early childhood football coaching, especially in football schools, the implementation of training programs that specifically aim to improve dribbling agility is still not carried out optimally. Based on the results of initial observations made on Football School ERLA U-12 players in Larangankulon Village, players' dribbling skills still need to be improved, especially in terms of dribbling speed and the ability to change direction when passing obstacles or facing opponents. Some players still have difficulty in maintaining ball control when changing direction quickly so that the effectiveness of dribbling in the game becomes less optimal. This condition shows that the right and effective form of training is needed to improve the player's agility and dribbling ability.

This study was conducted to analyze the effect of shuttle run and zigzag run training on dribbling agility in U-12 players of ERLA Football School in Larangankulon Village in 2025. More specifically, this study aims to determine the effect of shuttle run training on dribbling agility, determine the effect of zigzag run training on dribbling agility, and determine the difference in the effect between the two forms of training on dribbling agility of players. The novelty of this study lies in the use of two forms of agility training, namely shuttle run and zigzag run, which are directly related to dribbling agility skills in 12-year-old soccer players. Previous studies generally only examined general agility, while this study examined more specific agility, namely dribbling agility in soccer, in young athletes in soccer schools. And research on this topic has never been done before.

METHOD

The method in this study is to use an experimental research method with the relationship of 2 causal elements that cause changes in other factors. (Sugiyono, 2013) explained that "experimental research methods can be interpreted as research methods used to find the effects of certain treatments on others under controlled conditions. In this study, the researcher used a pretest design with a sample of 20 students from Larangankulon Village. This research was carried out with an exercise program that had to be applied by two sample groups. Each sample group was given treatment for 16 meetings. In one week, meetings are held 3 times.

In this study, a static pretest-postest research design was used with a population of 20 Football School ERLA U-12 students. The sample used in this study was 20 students. The number of samples taken from this population uses the saturated sampling technique which is a non-probability sampling technique. As explained by (Sugiyono, 2013) that "Nonprobability sampling is a sampling technique that does not provide the same opportunity for every element or member of the population to be selected as a sample". One of these sampling techniques is saturated sampling. (Sugiyono, 2020) explains that "Saturated sampling is a sample determination technique when all members of the population are used as samples". This is often done when the population is relatively small, less than 30 people, or when the study wants to make generalizations with very small errors. In this study, primary data types were used. Primary data was obtained directly at the time of field retrieval whose results could not be generalized, so it could only describe the conditions at that time.

The instrument used in this study is the dribbling agility test. This test is used to measure a player's ability to dribble quickly while making a change of direction. The equipment used in this test includes a football, a cone or obstacle, a stopwatch, and a soccer field. The test is carried out by the player dribbling through several cones that have been arranged in a row with a certain distance until they reach the finish line. Players start the test from the starting line while carrying the ball, then dribble through each obstacle to the finish line. The player's travel time from start to finish is measured using a stopwatch and recorded in

seconds. The faster the time the player gets, the better his dribbling agility ability.

The data analysis used in this study is t-test analysis (t-test). To test the validity of the sample, it is necessary to carry out a normality test and a homogeneity test. The data analysis technique in this study uses a T-test to determine whether the data is normal or not. If the data is abnormal, then a non-parametric test is required, in addition to that it is also necessary to carry out a homogeneity test to test whether the data is homogeneous or not.

RESULTS AND DISCUSSION

This study was conducted to determine the effect of shuttle run and zig-zag run exercises on ball dribbling agility and to find out which exercise motor has a significant effect on increasing dribbling agility of Football School ERLA U-12 students. The data analysis carried out in this study was a non-parametric test analysis. To test the validity of the sample, it is necessary to carry out a normality test and a homogeneity test.

The researcher will explain the effect of shuttle run training and zig-zag run training on the dribbling agility of Football School ERLA U-12 students. This research was conducted from December 21, 2025 to January 29, 2026, the subjects of this study were 20 active Football School ERLA U-12 students. The data obtained in this study was by using the Prestest-posttest control group design experimental method. The following are the results of the research data conducted at Football School ERLA U-12:

Table 1. Prestest-posttest control group design experimental

Name	Shuttle Run		Name	Zig-zag Run	
	Pre-Test	Post-Tests		Pre-Test	Post-Tests
X1	5.82	5.21	Y1	6.08	5.50
X2	5.75	5.10	Y2	5.85	5.22
X3	6.05	5.38	Y3	5.72	5.08
X4	5.90	5.32	Y4	5.93	5.28
X5	5.68	5.05	Y5	6.12	5.47
X6	5.95	5.30	Y6	5.88	5.25
X7	6.10	5.45	Y7	5.76	5.12
X8	5.80	5.18	Y8	5.98	5.33
X9	5.70	5.02	Y9	6.15	5.52
X10	6.00	5.35	Y10	5.84	5.20

The **Table 2** above shows that before getting treatment in the shuttle run group, the dribbling agility test had an average score of 5.8750 with a standard deviation of 14759, with a high score of 6.10 and a low score of 5.68. After being given shuttle run exercises, the maximum dribbling agility test score is 5.45 and the lowest score is 5.02. The standard deviation is 14691 and the average is 52360.

Table 2. Descriptive Statistics

Variable	N	Minutes	Max	Red	Std. Dev
Pretest SR	10	5.68	6.10	5.8750	.14759
Post-Traumatic Stress	10	5.02	5.45	5.2360	.14691
Prates ZR	10	5.72	6.15	5.9310	.14888
ZR Post Tests	10	5.08	5.52	5.2970	.15571

In the zig-zag run group, before being given dribbling agility training treatment, the highest zig-zag run precision test score was 6.15 and the lowest score was 5.72, while the average score was 5.9310 with a standard deviation of 14888. After being given zig-zag running exercises, the highest dribbling agility test score was 5.52 and the lowest score was 5.08. The standard deviation is 15571 and the average is 5.2970.

Table 3. Normality Test

Sig Name	Description
Pres. SR .200	Significant
Postest SR .200	Significant
Prates ZR .200	Significant
Postest ZR .200	Significant

The normality test was carried out using the Kolmogorov-Smirnov test to find out whether the research data was distributed normally or not. The results of the normality test showed that the significance value for all variables was greater than 0.05. The significance value of the pretest shuttle run is 0.200, the shuttle run posttest is 0.200, the pretest zig-zag run is 0.200, and the posttest zig-zag run is 0.200.

The pretest and posttest in shuttle run exercises have normal values according to the Kolmogorov-Smirnov normality test. Pretest and posttest in zig-zag run training are also categorized as normal. In this case, parametric tests can be performed as all data is normal. Unless there is abnormal data, nonparametric tests cannot be performed.

Table 4. Paired Sample Test

	Variable	Signs (p)	Description
Couple 1	Pretest SR Postest SR	0,000	Significant
Couple 2	Prates ZR Postest ZR	0,000	Significant

Based on the results of the t-test analysis of paired samples, the results of the comparison of pretest and posttest scores in each exercise group were obtained.

In the shuttle run training group (Pair 1), an average difference of 0.639 seconds was obtained, indicating a decrease in dribbling travel time after being given training treatment. The t-value is calculated as 68.247 with a degree of freedom (df) = 9 and a significance value (Sig. 2-tail) of 0.000. Since the significance value was less than 0.05, it can be concluded that there was a significant difference between the pretest and posttest results in the shuttle run training group. This shows that shuttle run training has a significant influence on increasing the dribbling agility of football players.

Meanwhile, in the zig-zag run training group (Pair 2) an average difference value of 0.634 seconds was obtained, which also showed an improvement in dribbling ability after the training treatment. The t-value is calculated as 97.061 with df = 9 and a significance value of 0.000, which means it is smaller than 0.05. Thus, it can be concluded that the zig-zag run practice also has a significant influence on the improvement of the dribbling agility of football players.

In addition, the 95% confidence interval in both groups did not pass zero, namely 0.61782–0.66018 in the shuttle run group and 0.61922–0.64878 in the zig-zag run group. This further reinforces that there is a real difference between pretest and posttest scores after being given sports treatment.

Overall, the results of this analysis show that both training methods, namely shuttle run and zig-zag run, are effective in increasing the dribbling agility of soccer players.

Based on the results of the effect size analysis using Cohen and Hedges corrections, a value was obtained that showed how much influence sports treatment had on the increase in dribbling agility of soccer players.

In the shuttle run exercise group (Pair 1), Cohen's d value was 21.582 with a 95% confidence interval between 11.799 and 31.394. The calculation results using Hedges correction showed a value of 20.668 with a confidence interval between 11.299 to 30.064. The effect size value falls into the category of effects is very large, which suggests that shuttle run exercises have a very strong influence on improving the dribbling agility of soccer players.

In the zig-zag run exercise group (Pair 2), Cohen's d-value was 30.693 with a 95% confidence interval between 16.797 and 44.636, while Hedges' correction value was 29.393 with a confidence interval between 16.086 and 42.745. The value of the effect size also falls into the very large category, which suggests that the zig-zag run exercise has a very strong influence on the improvement of the player's dribbling agility.

The results of the study showed that zig-zag run training had a greater impact on improving dribbling agility compared to shuttle run training in Erla Football School U-12 students. This can be explained because the movement pattern in zig-zag run training is more similar to dribbling movements in soccer, which often involve rapid changes of direction while controlling the ball (Pendidikan et al., 2025).

The zigzag run drill trains coordination, balance, changes of direction, and body control while moving in a zigzag motion, making it highly relevant to dribbling techniques in soccer (Yusuf et al., 2022). In dribbling, players not only run straight but also must quickly move past opponents by turning, twisting, and changing direction without losing control of the ball (Milanović et al., 2025). Therefore, the zigzag run drill is more specific to dribbling movements than the shuttle run, which emphasizes forward and backward running speed (Milanović et al., 2025).

Previous research has also shown that zigzag running training has a significant impact on improving dribbling ability (Marda et al., 2024). Research by (Marda et al., 2024) shows that zig-zag run training can significantly improve dribbling skills, where athletes' dribbling time decreases after being given zig-zag run training . This indicates that zigzag running training is effective in improving speed and control when dribbling. This is because zig-zag run training emphasizes rapid changes in body direction and coordination of foot movements, which are essential in soccer dribbling (Saputra & Bulqini, 2024).

Based on the research results and supported by previous research, it can be concluded that zig-zag run training is more effective in improving dribbling agility than shuttle run because the movement pattern is more similar to dribbling movements in soccer games which require rapid changes of direction, coordination, balance, and control of the ball while moving (Pramudya et al., 2026).

CONCLUSION

Based on the results of the research that has been conducted, it can be concluded that shuttle run and zig-zag run exercises have an

influence on increasing the agility of dribbling the ball of the Erla Football School players. This shows that both training methods can be used to improve players' dribbling agility. However, based on the calculation results of the improvements obtained from both training methods, the zig-zag run training method proved to be more effective in improving the dribbling agility of Football School Erla players compared to the shuttle run training method. Thus, zig-zag run training is more recommended as a training method to improve dribbling agility in soccer games.

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