INDONESIAN JOURNAL OF SPORT MANAGEMENT
Department of Physical Education, Universitas Majalengka, Indonesia
ISSN 2776-706X.

The Effectiveness of Size 3 and 4 Balls in Training Soccer Player's Dribbling Technique

Elsa Febrianty[1A-D], Mochamad Yamin Saputra*[2BD], Ridha Mustaqim[3BC]

[1-3]Sport Coaching Education, Faculty of Sports and Health Education, University of Education Indonesia, Bandung, Indonesia

ABSTRACT

This study aims to determine the effect of ball mastery training using size 3 and size 4 soccer balls on the dribbling ability of football players aged 8–10 years at Thirteens Football Academy. The research employed a quasi-experimental method with a two-group pretest-posttest design. The sample consisted of 22 players, divided into two groups using ordinal pairing, with 11 participants in each group. The first group received training using a size 3 ball, while the second group used a size 4 ball. Data were collected using the zig-zag slalom dribbling test. The paired sample t-test results showed a significant improvement between pretest and posttest scores in both groups: size 3 ball (sig. 0.000) and size 4 ball (sig. 0.000). However, the independent sample t-test revealed no significant difference between the two groups (sig. 0.959), indicating that ball mastery training with either ball size is equally effective in enhancing dribbling skills in young players. In conclusion, ball mastery training significantly improves dribbling ability in children, regardless of whether a size 3 or size 4 ball is used. This research can serve as a reference for designing youth football training programs, particularly in selecting the appropriate ball size based on the players' developmental stage.

Keywords: Ball mastery; ball size; Dribbling; Ability; Youth football

Corresponding author:

*Mochamad Yamin Saputra, Sports Coaching Education, Faculty of Sports and Health Education, University of Education Indonesia, Bandung, Indonesia
Email: Mochyamins@upi.edu

Article History:

Submitted: July, 2025
Accepted: August, 2025
Published: August, 2025

Authors' contribution:

A) Conception and design of the study;
B) Acquisition of data;
C) Analysis and interpretation of data;
D) Manuscript preparation;
E) Obtaining funding.

Cite this article:

Febrianty, E., Saputra, M. Y., & Mustaqim, R. (2025). The Effectiveness of Size 3 and 4 Balls in Training Soccer Player's Dribbling Technique. *Indonesian Journal of Sport Management, Vol.* 5(3), 607-617. https://doi.org/10.31949/ijsm.v5i3.15468

INTRODUCTION

Dribbling in soccer is a technique used by players to dribble the ball while moving, with the aim of getting past opponents, creating space, and organizing attacks (Adolph, 2023). This technique utilizes various parts of the foot, such as the inside, outside, and back of the foot, to control the ball effectively. Effective dribbling allows players to maintain possession of the ball in difficult situations and adapt quickly to the dynamic nature of the game (Herold et al., 2021). Additionally, dribbling also serves to deceive opponents, allowing players to create opportunities to pass or shoot at the goal. Good dribbling requires a combination of speed, control, and the ability to read the situation on the field (Huijgen et al., 2010).

In soccer, there are various basic technical skills that every player must master, one of which is dribbling (Brink et al., 2023). Dribbling is the technique of carrying the ball with the feet while moving, with the aim of passing opponents, opening up space for attack, and maintaining possession of the ball. This technique plays an important role in creating

scoring opportunities and maintaining the tempo of the game to the team's advantage (Herold et al., 2021). Dribbling is not just about carrying the ball forward, but a combination of speed, agility, ball control, and the ability to make the right decisions under pressure. To perform dribbling effectively, players must be able to control the ball using various parts of the foot, such as the inner, outer, and back of the foot (Dipiarsa et al., 2020). This allows players to move swiftly in various directions without losing control of the ball, even in fast-paced situations with intense pressure from opponents (Huijgen et al., 2010).

In the context of early-age development, particularly for children aged 8–10 years, dribbling technique is one of the primary focuses in soccer skill development. At this age, children are in the golden phase of motor development and basic coordination. However, they still face limitations in terms of movement control, reaction speed, and tactical understanding of the game. Therefore, basic technique training such as dribbling must be conducted systematically, progressively, and in accordance with their age characteristics (Russell & Kingsley, 2011) (Berk, 2015). One method proven effective in training ball control and dribbling is ball mastery training. This exercise emphasizes ball control through repetitive foot movements performed at high intensity (Raga et al., 2023). The goal of ball mastery exercises is for players to be able to fully control the ball with just their feet, whether the ball is stationary or moving (Wiratmana, 2015). The movements in ball mastery, such as toe taps, inside-outside dribble, sole roll, and other combinative movements, are designed to improve touch, control, and coordination between the feet and the ball (Shalahudin & Sifaq, 2023) (Vișan et al., 2023).

However, in the process of practicing this technique, the size of the ball used also greatly determines the success of learning. Many youth soccer coaches use balls that are not appropriately sized for children. Balls that are too large and heavy often make it difficult for children to dribble because they require more strength and control technique. On the other hand, using balls that are too small and light causes the ball to move too quickly and be difficult to control for children who are just beginning to learn dribbling systematically (Miller, 2012). According to the Competitive Engineering approach developed by (Meyer, 2015), modifications to the playing environment, such as ball size, field size, game duration, and other technical rules, need to be adjusted to the physical abilities and cognitive development of children. This approach aims to create training and competition conditions that support the optimal development of technical and playing skills for young athletes.

In practice, size 3 and 4 soccer balls are the most commonly used balls in training players aged 8–12 years. Size 3 balls have a smaller diameter and are lighter in weight than size 4 balls. Size 3 balls can help improve foot speed and coordination because they are easier to control. Meanwhile, size 4 balls, although slightly larger and heavier, provide an experience closer to actual match conditions. Therefore, it is important to investigate which of the two ball sizes is more effective in improving dribbling skills through ball mastery training methods.

Previous research conducted by (Katis & Kellis, 2014) showed that dribbling training on a small field with high opponent pressure requires young players to efficiently manage speed and direction of movement. Meanwhile, (Keskin, 2015) noted that ball control is the foundation of soccer, especially at the youth level. Research by (Fleck et al., 2015) even states that dribbling is the most important skill in soccer, surpassing passing, first-touch control, and defense.

However, in Indonesia, many young players still lack good dribbling skills, particularly in terms of speed, direction of movement, and ball control under pressure. Many youth coaches have not yet implemented structured ball mastery training, and the use of training balls often does not consider size appropriateness for the players' age. This impacts the lack of optimal dribbling technique development in players aged 8–10 years. Given this reality, the researcher is interested in conducting research on the effect of ball mastery training using size 3 and 4 balls on soccer dribbling ability. This study will be conducted on players from the Thirteens Football Academy aged 8–10 years, who are currently in the early stages of learning to play soccer. The study aims to determine whether the use of different ball sizes will have a significant impact on improving dribbling skills after participating in structured ball mastery training.

This study uses a pretest and posttest method in one group, where the children's dribbling skills will be measured before and after participating in the training program for several weeks. The results of this study are expected to provide a real contribution to the field of early age soccer training, particularly in terms of selecting the appropriate training methods and ball sizes to support the development of players' basic techniques.

METHOD

This study uses a quasi-experimental method with a two-group pretest-posttest design. This approach was chosen because the researcher wanted to determine the extent to which ball mastery training using different ball sizes affects players' dribbling ability, but did not involve a full control group. According to (Sugiono, 2019), quasi-experimental research aims to observe the effect of treatment on a variable, even though not all external variables can be fully controlled due to limitations in field conditions.

Using a quantitative approach, this study focused on participants aged 8 to 10 years to observe the impact of using different ball sizes in ball mastery training on their dribbling skills. The experimental method was chosen because it allows for a treatment group that can be compared. The research design used is an independent group with pretest and posttest measurements, as explained by (Morgan et al., 2013).

This study uses a two-group pretest-posttest design, which aims to determine the effect of ball mastery training with size 3 and size 4 balls on the dribbling ability of soccer players. More specifically, this design involves two groups, each of which is given different treatments to test the two independent variables that are the main focus of this study.

This research design was adapted from a design used in a previous study. In the study conducted by (Arpansyah et al., 2022), the two-group pretest-posttest design approach was also used because the study involved two groups, each of which was given a treatment, and the results were then compared.

The time and location

The population in a study is the entire group of subjects that have certain characteristics relevant to the research objectives. The existence of a population is very important because it forms the basis for drawing conclusions from the data obtained. According to (Fraenkel et al., 2012), the population refers to all individuals in a group that is the target of the study. In other words, the population is a collection of individuals who share certain characteristics, although the degree of similarity may not be absolute, but they still belong to a similar category to be used as research subjects. In this study, the

population used was all male players aged 8 to 10 years at the Thirteens Football Academy, with a total of 22 people.

All members of the population were used as the research sample, so the technique used was total sampling. The sample was then divided into two groups based on their dribbling skills. The group with lower dribbling skills was given training using a size 3 ball, while the group with better skills was trained using a size 4 ball. The grouping was done using the Ordinal Pairing method, which, according to (Sugiono, 2019), is a grouping technique aimed at ensuring that each group has a relatively balanced skill level. The grouping process was carried out using the A-B-B-A sequence system, ensuring that each participant had a fair chance to receive the predetermined treatment.

For coaches, especially in soccer, it is recommended to start ball mastery training with a size 3 ball first, then gradually move up to a size 4 ball so that players can adapt more easily. For soccer schools or academies, it is important to provide balls that are appropriate for the age of the children to make training more effective. For further research, it is recommended to conduct studies with longer training periods and increase the number of participants to obtain broader and more robust results. For students and college students, ball mastery training can serve as a reference or inspiration for conducting basic dribbling technique training for young children.

This study was conducted in two main stages, namely the pretest and posttest stages. To provide a clear picture of the implementation process, the researcher will describe each step taken systematically. In the initial stage, the researcher first determined the sample from the total population. Next, the sample participants underwent a pretest to measure their dribbling skills before the treatment was given. After that, the researcher used the ordinal pairing method with the A-B-B-A sorting system to divide the sample into two balanced groups. Group A was given treatment in the form of ball mastery training using a size 3 ball, while group B used a size 4 ball. The training consisted of five variations of basic ball mastery movements, where each movement was performed for one minute and repeated three times. In the first two repetitions, participants were allowed to look down to adjust their foot coordination with the ball, but in the third repetition, participants were asked to keep their gaze straight ahead to optimize ball control training.

During the training, participants were given a two-minute rest period while waiting for their turn, as well as an additional 10-minute rest period after the entire training session was completed to avoid excessive fatigue. This training program focused on improving dribbling skills through the ball mastery method and was conducted over five weeks with a frequency of three times per week, namely every Monday, Thursday, and Saturday. This schedule has been adjusted to accommodate the minimum recovery time between training sessions. After the entire treatment is completed, a post-test is conducted to evaluate the participants' dribbling skill development. The results of this post-test will indicate whether there is a difference in dribbling skill improvement between the group using size 3 balls and the group using size 4 balls among young players.

The Slalom Test is used to determine the effect of ball mastery training on dribbling ability. This test is used to determine the ability to increase and decrease speed, change direction, and run at different angles (Mitrousis et al., 2023).

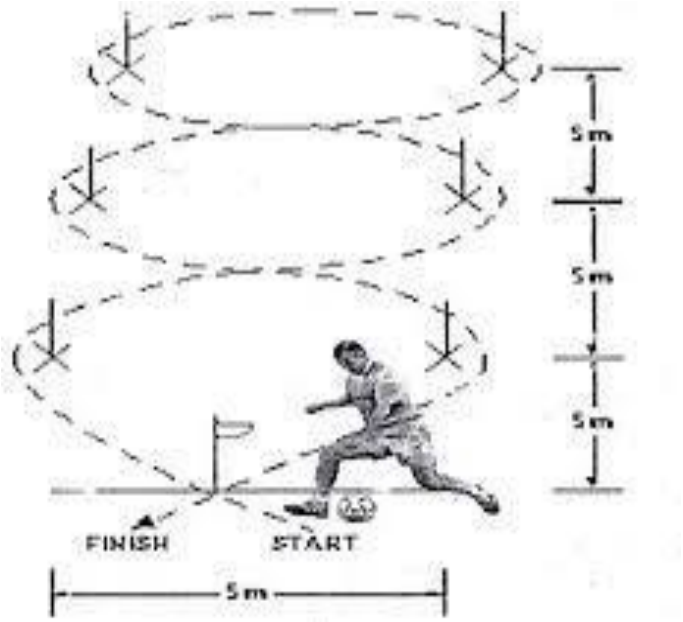

Figure 1. Research Instrument
Source: (Efriyansyah & Saputra, 2022)

In this study, data were analyzed and processed using SPSS version 26 statistical software. SPSS (Statistical Package for the Social Sciences) is one of the most widely used statistical software programs in quantitative research due to its ability to manage, present, and analyze data efficiently. This program facilitates researchers in conducting statistical tests, creating tables, and generating accurate data interpretations. As a result, the use of SPSS significantly aids in supporting the research process, particularly in the systematic systematic systematic and objective processing and presentation of data.

RESULTS AND DISCUSSION

Findings

The purpose of this study is to determine whether there is a significant effect of ball mastery training on soccer dribbling ability. The study was conducted using a zig-zag slalom test instrument, involving zig-zag dribbling through corners spaced 5 meters apart, as described in the research instrument sub-section of Chapter III. The results of the test will be analyzed using a statistical approach appropriate to the research problem. The data in this study were processed and analyzed based on the steps outlined.

Table 1. Description of research data

	N	Minimum	Maximum	Mean	Std. Deviation
pretestball3	11	32	53	41.72	6.517
postestball3	11	30	50	39.21	6.084
pretestball4	11	35	53	41.89	6.178
posttestball4	11	33	51	39.33	5.301
Valid N (listwise)	11				

This table shows the data obtained from the pretest of size 3 soccer balls, which involved 11 participants. The minimum score on the pre-test was 32, the maximum score was 53, the average score was 41.72, and the standard deviation was 6.517. The post-test data for size 3 soccer balls also involved 11 participants. The minimum post-test score was

30, the maximum post-test score was 50, the average post-test score was 39.21, and the standard deviation was 6.084. The data obtained from the initial (pre)test of size 4 soccer balls involved 11 participants. The minimum score was 35, the maximum score was 53, the average score was 41.89, and the standard deviation was 6.178. Data from the posttest using a size 4 soccer ball involved 11 participants. The minimum score on the pretest was 33, the maximum score was 51, the average score was 39.33, and the standard deviation was 5.301.

Table 2. Normality Test

	ball4	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
ball3	pretestball3	.164	11	.200*	.939	11	.507
	postestball3	.155	11	.200*	.944	11	.568
	pretestball4	.197	11	.200*	.934	11	.451
	posttestball4	.167	11	.200*	.935	11	.460

This table shows the results of normality tests using the Shapiro-Wilk method on pretest and posttest data for both groups. Significance values (Sig.) greater than 0.05 indicate that all data are normally distributed, thus fulfilling the assumptions for parametric testing.

Table 3. Homogeneity Test

		Levene Statistic	df1	df2	Sig.
ball3	Based on Mean	.171	1	20	.684
	Based on Median	.119	1	20	.733
	Based on Median and with adjusted df	.119	1	19.731	.733
	Based on trimmed mean	.176	1	20	.679

This table shows the results of the variance homogeneity test using Levene's Test. The significance value (Sig.) of 0.684 (> 0.05) indicates that the variances of the two groups are homogeneous, so an independent t-test can be performed.

Table 4. Uji Paired Sample T-test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre-Test - Post-Test ball3	2.51000	1.05090	.31686	1.80399	3.21601	7.921	10	.000

This table presents the results of the paired sample t-test on the group that used size 3 balls. A significance value of 0.000 (< 0.05) indicates a significant difference between the pretest and posttest scores, suggesting that ball mastery training with size 3 balls is effective in improving dribbling skills.

Table 5. Uji Paired Sample T-test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre-Test - Post-Test ball4	2.55909	1.51501	.45679	1.54129	3.57689	5.602	10	.000

This table shows the results of the paired sample t-test on the group that used size 4 balls. A significance value of 0.000 (< 0.05) indicates a significant improvement in dribbling ability after ball mastery training with size 4 balls.

Tabel 6. Independent Sample Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Result	Equal variances assumed	.171	.684	-.052	20	.959	-.125	2.433	-5.201	4.950
	Equal variances not assumed			-.052	19.632	.959	-.125	2.433	-5.207	4.956

The sig value (0.959) > 0.05 was obtained, so Ho was accepted. It can therefore be concluded that there is no significant difference in the effect of ball mastery training on dribbling ability using size 3 and 4 soccer balls.

Discussion

This study aims to determine the effect of ball mastery training using size 3 and size 4 soccer balls on the dribbling skills of 8–10-year-old players at Thirteens Academy. The research sample was divided into two groups: one trained with size 3 balls and the other with size 4 balls. Both groups received the same training program. Based on the data analysis, it was found that ball mastery training significantly improved dribbling performance in both groups, regardless of ball size. The results of the paired sample t-test for the group using size 3 balls showed a significance value (Sig. 2-tailed) of 0.000 and a t-value of 7.921. Since the significance value was less than 0.05, it can be concluded that there was a significant improvement in dribbling ability after the training. This indicates that ball mastery training with size 3 balls is effective in helping young players aged 8–10 master dribbling techniques. Size 3 balls are lighter and smaller, making them easier for children to control, especially during the fundamental learning stage. The ball mastery drills included repetitive ball touches such as inside-outside touches, toe taps, and zig-zag dribbles. Using a ball suited to the child's body size and motor skills allows them to learn the techniques more quickly.

Children aged 8–10 are still in the stage of developing coordination skills. According to the theory of motor development (Berk, 2015), this age range is considered the "golden period" for building basic physical abilities. When given appropriate training tools, such as a size 3 ball, their learning process becomes easier and more enjoyable. Because the ball is not too heavy, children do not tire quickly and can train for longer periods with more touches. The findings of this study suggest that size 3 balls are a suitable choice for improving young players' dribbling skills, as the training not only develops technical ability but also boosts confidence in playing soccer. In the group that used size 4 balls, the paired sample t-test results also showed a significance value of 0.000 with a t-value of 7.657. This means that, similar to the size 3 group, ball mastery training with size 4 balls significantly improved dribbling skills. Size 4 balls are slightly bigger and heavier than size 3, but still suitable for children aged 8–10. These balls provide an added challenge, making them harder to control and requiring players to adapt by improving foot strength and ball control. Thus, the training not only focuses on basic techniques but also develops endurance and movement stability during dribbling.

Although slightly heavier, size 4 balls offer benefits by helping children adapt to conditions closer to real match situations. In real games, players must not only know the techniques but also adapt to the ball and handle pressure from opponents. Therefore, ball mastery training with size 4 balls remains effective when structured and progressive. Players learn to maintain balance, focus, and make quick decisions while dribbling. To test whether there was a significant difference between training with size 3 and size 4 balls, an independent sample t-test was conducted. The result showed a significance value of 0.959, which is greater than 0.05, indicating no statistically significant difference between the two groups. Although both groups improved their dribbling skills, the difference between them was not large enough to be considered significant. Both ball sizes can therefore be effectively used in ball mastery training—size 3 is easier to control and suitable for accelerating technique mastery, while size 4 offers more challenge and helps players adapt to real match conditions.

While the statistical difference was insignificant, coaches can still consider player characteristics when choosing ball sizes. For beginners or players who struggle with ball control, size 3 may be more appropriate. For players with a solid technical foundation, size 4 can help improve readiness for competitive matches. The key is consistent and enjoyable training so that children remain motivated and develop to their fullest potential. This research confirms that ball mastery training is highly effective for improving dribbling, and ball size can be adjusted without significantly affecting training outcomes. The improvement in dribbling ability observed in this study was achieved through a training program consisting of 16 sessions, including 2 sessions for pretest and posttest, and 14 sessions of ball mastery training. Each session focused on ball control using the feet. Despite some challenges during implementation, such as varying training conditions, player attendance, and weather disruptions, these were addressed by maintaining player motivation, fostering teamwork, and creating a fun and engaging training environment.

Some players faced challenges in alternating foot movements effectively, controlling the ball due to mismatched ball size and body posture, and maintaining balance while dribbling. However, with direct guidance from the researcher and the players' high motivation, ball mastery training successfully improved dribbling skills. The strong enthusiasm of Thirteens Academy players contributed to the positive results, as they approached the sessions with high energy and commitment.

CONCLUSION

The results of the study indicate that ball mastery training is highly effective in improving dribbling skills in young soccer players, whether using size 3 or size 4 balls. There is no significant difference between the two ball sizes, so both can be used flexibly, adapting to each player's skill level and technical development needs. Thus, these findings can serve as a reference in designing soccer training programs for children, particularly in determining the appropriate ball size to support optimal improvement in dribbling skills.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

FUNDING

This research received no external funding.

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