

The Effect of Plyometric Barrier Hops and Jump-to-Box Training on Shooting Accuracy in Futsal among Extracurricular Students at SMA PGRI 2 Palembang

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Abstract
<p>Objectives. This study aimed to examine the effect of plyometric training methods—specifically <i>barrier hops</i> and <i>jump to box</i>—on the shooting accuracy of futsal extracurricular students at SMA PGRI 2 Palembang. The research intended to identify which of the two training models was more effective in enhancing shooting performance.</p> <p>Materials and Methods. A quasi-experimental design with a two-group pretest-posttest format was employed. The study sample consisted of 20 students, divided into two treatment groups: 10 students participated in barrier hops training, and 10 in jump to box training. Pretest and posttest shooting accuracy scores were recorded for both groups. Statistical analysis was performed using paired <i>t</i>-tests to determine the significance of differences before and after the intervention.</p> <p>Results. The barrier hops group showed an increase in mean shooting accuracy from 24.30 (pretest) to 33.30 (posttest), with a gain of 9 points. The jump to box group showed a greater increase, from a mean of 23.20 to 38.20, with a gain of 15 points. The <i>t</i>-test results confirmed significant improvements in both groups (barrier hops: $t = 4.713 \geq t_{table} = 1.734$; jump to box: $t = 7.727 \geq t_{table} = 1.734$), with the jump to box method being more effective overall.</p> <p>Conclusions. Both plyometric training methods significantly improved futsal shooting accuracy among the students. However, jump to box training was found to be more effective than barrier hops in enhancing shooting precision.</p>
Keywords: Plyometric Training, Barrier Hops, Jump To Box, Shooting Accuracy, Futsal

Introduction

Sport is a physical activity that engages both the upper and lower body, aiming to improve quality of life, maintain physical fitness, and promote overall health. Beyond its physiological benefits, sport also serves as entertainment and a means for individuals to enhance their personal skills or achieve professional athletic performance. In modern society, sport plays a crucial role in daily life, instilling values such as discipline, sportsmanship, perseverance, competitiveness, teamwork, rule comprehension, and decision-making abilities (April, 2022).

Futsal, a modified form of soccer, is played on a smaller, indoor court with two teams of five players each. It is often used as a training tool to improve basic football techniques and skills, as the flat surface and smaller playing field allow for faster, more controlled movement and dynamic play (Putra Pratama et al., 2020). Due to its engaging and fast-paced

nature, futsal has become increasingly popular among youth, including both male and female players. This popularity is driven not only by its physical health benefits but also by its contribution to social interaction, mental health, and emotional well-being. Futsal can be classified as both a recreational and performance-oriented sport (Pramono & Mahfud, 2022).

The growing interest in futsal has led to its integration into extracurricular activities in schools. These activities are conducted outside regular class hours under teacher supervision and aim to develop students' talents, interests, skills, personalities, teamwork, and independence (Wahyudi et al., 2023). A fundamental objective in futsal is the ability to manipulate the ball effectively to score goals. One of the most critical techniques in achieving this is shooting. An ideal shooting performance is characterized by power and precision—qualities that make the ball difficult for goalkeepers to block.

However, developing accurate and powerful shooting ability is a complex task influenced by multiple factors, one of which is lower limb explosive power. This component of physical fitness is essential for executing forceful and accurate shots. Plyometric training, which focuses on explosive muscle contraction through stretch-shortening cycles, is widely used to improve such performance (Jefri, 2022).

Various types of plyometric exercises—particularly *barrier hops* and *jump to box*—have been found effective in enhancing leg power. Barrier hops involve jumping over a height-adjustable obstacle to improve leg strength and coordination (Triyanti, 2021), while jump to box exercises involve jumping onto a platform to train muscle explosiveness, joint stability, and balance, which are vital for safe and effective shooting in futsal (Mukti et al., 2023).

Preliminary observations conducted by the researcher at SMA PGRI 2 Palembang revealed that many futsal extracurricular students struggled with shooting accuracy. These difficulties were attributed to inadequate lower limb power, the absence of structured training programs, inconsistent practice schedules, and limited training facilities. As a result, there is a clear need for targeted training interventions that improve lower body explosiveness and overall shooting performance.

This study hypothesizes that both barrier hops and jump to box plyometric exercises significantly improve shooting accuracy in futsal, with one method potentially being more effective than the other. The primary objective is to evaluate and compare the effects of these two training models on the shooting accuracy of futsal players. Through this research, the study aims to contribute to evidence-based practices in physical training for youth athletes, particularly within the school extracurricular context.

Materials and Methods

Study Participants.

This study involved 20 students from the futsal extracurricular program at SMA PGRI 2 Palembang during the 2024/2025 academic year. All participants were male students aged between 16 and 17 years. A total sampling technique was applied, in which the entire population was included as the research sample due to the population size being fewer than 100 individuals. The inclusion criteria required that participants were active members of the futsal extracurricular group and in good health, without any history of injuries that could interfere with the training program. All participants voluntarily agreed to partake in the study and were divided equally into two groups of 10 students each.

Study organization.

This study employed a quantitative research approach using a quasi-experimental design with a two-group pretest-posttest format. The independent variables were two different plyometric training methods: (X₁) barrier hops and (X₂) jump to box. The dependent variable (Y) was shooting accuracy in futsal.

The experimental design was structured as follows:

1. Group 1 received the barrier hops training program.
2. Group 2 received the jump to box training program.

Each training session was conducted over 16 sessions within a four-week period during the second semester of the 2024/2025 academic year. The pretest was administered before the intervention to assess initial shooting accuracy levels, and a posttest was conducted after the intervention to evaluate the improvement. Ordinal pairing was used to ensure balanced grouping based on pretest scores.

The shooting accuracy test was adapted from Narlan et al. (2017), where each participant was given 10 opportunities to shoot a ball toward a 3 × 2 meter futsal goal from a distance of 10 meters. The goal area was marked with score zones to measure accuracy.

The facilities and equipment included: a futsal field, futsal balls, whistles, scoring sheets, pens, stopwatches, cones, tape, and a plyometric jump box. Each test was conducted under the supervision of qualified instructors.

Statistical analysis.

Data analysis began with a prerequisite test of normality and homogeneity.

1. **Normality Test:** The Kolmogorov–Smirnov test was used to determine whether the data were normally distributed. A significance value $(p) \geq 0.05$ indicated that the data followed a normal distribution.

2. **Homogeneity Test:** Levene’s test was used to assess the equality of variances between groups. A significance value ≥ 0.05 indicated homogeneous data.

Upon meeting these assumptions, hypothesis testing was conducted using the independent samples t-test. The null hypothesis (H_0) stated that there was no significant effect of plyometric training on shooting accuracy, whereas the alternative hypothesis (H_1) stated that there was a significant effect.

The t-test formula applied was:

$$t = \frac{\bar{x} - \mu}{s / \sqrt{n}}$$

Where:

- 1. \bar{x} : sample mean
- 2. μ : hypothesized population mean
- 3. s : standard deviation
- 4. n : sample size

The significance level was set at $\alpha = 0.05$. Hypotheses were interpreted as follows:

- 1. H_0 accepted if $t_{\text{calculated}} \leq t_{\text{table}}$ (no significant effect),
- 2. H_0 rejected if $t_{\text{calculated}} \geq t_{\text{table}}$ (significant effect).

Results

This study involved 20 futsal extracurricular students at SMA PGRI 2 Palembang, divided into two groups: barrier hops training and jump to box training, conducted over 16 sessions. Evaluations were carried out using pretest and posttest to measure shooting accuracy.

Table 1. Average Pretest and Posttest Shooting Accuracy Scores

Training Group	Pretest (Mean)	Posttest (Mean)	Difference
Barrier Hops	24.30	33.30	+9.00
Jump to Box	23.20	38.20	+15.00

A significant improvement was observed in both groups. The *jump to box* group showed a greater average increase (+15.00) compared to the *barrier hops* group (+9.00). The distribution of score categories also demonstrated a positive shift. The following table shows the pretest distribution in the *jump to box* group:

Table 2. Pretest Frequency Distribution – Jump to Box Group

Score Interval	Frequency (F)	Percentage (%)	Category
≥ 46	0	0%	Excellent
34 – 45	0	0%	Good
22 – 33	6	60%	Fair
11 – 21	4	40%	Poor
≤ 10	0	0%	Very Poor

After the training sessions, a notable shift occurred, as presented below:

Table 3. Posttest Frequency Distribution – Jump to Box Group

Score Interval	Frequency (F)	Percentage (%)	Category
≥ 46	1	10%	Excellent
34 – 45	7	70%	Good
22 – 33	2	20%	Fair
11 – 21	0	0%	Poor
≤ 10	0	0%	Very Poor

Overall, the findings indicate that both the *barrier hops* and *jump to box* training models were effective in improving futsal shooting accuracy among students. However, the *jump to box* method yielded a higher average improvement in performance.

Discussion

This study set out to test the hypothesis that plyometric training using the barrier hops and jump to box methods would improve shooting accuracy in futsal among high school students. The results confirmed this hypothesis, showing significant improvements in posttest scores for both groups. Notably, the jump to box method produced greater average gains compared to barrier hops training.

These findings are in line with prior studies, including research by Aditya Adi Prakarsa & Umar (2020), which demonstrated that plyometric training can enhance explosive power and shooting accuracy. Plyometric exercises are known to improve muscle contraction speed, neuromuscular coordination, and power output—key components in executing accurate and forceful futsal shots. The current study supports these claims, particularly by showing how jump to box training leads to superior improvements, likely due to the emphasis on vertical explosive movement that closely mimics shooting dynamics in futsal.

The significance of these results lies in their applicability to athletic training programs. Both training models proved to be effective, which means coaches working with young futsal athletes can incorporate either method into their regular routines. However, the

greater effectiveness of jump to box training suggests that it may be a more optimal choice when aiming to improve performance in a limited training time.

Practically, these results emphasize the importance of structured plyometric programs in school-based extracurricular sports. The improvements observed after just 16 sessions highlight how short-term, focused interventions can yield substantial performance benefits, even among adolescent athletes.

This study contributes to the growing body of literature supporting functional and explosive strength training in youth sports. Future research could explore how different volumes or combinations of plyometric drills impact other technical futsal skills, such as passing accuracy or defensive movements, to further enhance holistic player development.

Conclusions

This study aimed to examine the effect of plyometric training using the Barrier Hops and Jump to Box methods on shooting accuracy in futsal among extracurricular students at SMA PGRI 2 Palembang. Conducted over 16 sessions with 20 students divided equally into two groups, the study revealed that both training methods had a positive impact on shooting performance.

The Barrier Hops group showed a moderate improvement, with the average pretest score of 24.30 increasing to 33.30 in the posttest, marking a 9-point gain. The distribution of performance categories indicated that 60% of students were in the “Moderate” category and 40% in the “Good” category after training.

In contrast, the Jump to Box group demonstrated a more significant improvement. Their average score increased from 23.20 in the pretest to 38.20 in the posttest—an enhancement of 15 points. Furthermore, the posttest distribution showed that 70% of students were in the “Good” category, 20% in “Moderate,” and 10% reached the “Very Good” category.

These results indicate that while both methods are effective in improving shooting accuracy, the Jump to Box method is more impactful. This can be attributed to its emphasis on vertical explosive movements, which more effectively develop lower limb power, balance, coordination, and precision—all of which are crucial for accurate and powerful shooting in futsal.

Recommendation

Based on the findings of this study titled “*The Effect of Plyometric Training Using Barrier Hops and Jump to Box on Shooting Accuracy among Futsal Extracurricular Students at SMA PGRI 2 Palembang*”, the following recommendations are made:

1. **For Students:** It is recommended that students continue to train diligently and consistently to further develop their physical and technical skills. Emphasizing discipline and persistence in training can help unlock their full athletic potential.
2. **For Future Researchers and Practitioners:** The results of this study can serve as a reference for future research in sports training and physical education, particularly in enhancing sport-specific skills through plyometric methods. Further studies could explore the long-term effects or combine these methods with other training modalities for optimal outcomes.

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Conflict of interest

The author declares that there is no conflict of interest regarding the publication of this paper. All procedures were carried out independently and free from any commercial or financial relationships that could be construed as a potential conflict of interest.

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