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Personalised BEEF shooting training for female basketball players: Enhancing accuracy and consistency

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ABSTRACT

Background: Shooting accuracy is critical for basketball players to be able to score as many points as possible and outperform opponents. While it is critical to have the ability to score, female players in Palembang City tended to preserve their incorrect shooting form, which led to the inconsistency of their shooting accuracy. **Research Objectives**: This study aims to analyse the comparison between the effect of personalised and group repetition training on shooting accuracy and consistency for female basketball players. **Methods**: This study uses a pretest-posttest control group design, using SPSS v26 to generate the tabulation and statistical analysis. A total of 30 female basketball players aged 17-21 (19.14±1.18) were selected as the research sample. Participants were divided into two groups using ordinal pairing based on the results of the pretest from various competitive levels and participated in a 12-week training program tailored to their shooting mechanics and performance metrics. **Finding and Results**: Results indicated that the experimental group significantly improved shooting accuracy and consistency compared to the control group. The personalised training approach addressed individual biomechanical flaws and optimised shooting techniques, enhancing performance, which was shown in the average value of the experiment group that was higher than the control group. Additionally, players reported gaining more confidence and motivation due to the tailored nature of the training. **Conclusion**: This study highlights the potential of personalised training programmes in sports, emphasising the need for individualised approaches to optimise athlete performance. Further research is recommended to explore long-term effects and applicability across different sports skills and levels.

Keywords: Personalized training; shooting accuracy; female basketball players; sports performance

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INTRODUCTION

Shooting is one of the basic basketball techniques that are very decisive in achieving victory (Ramadhan & Irawan, 2022; Sanjaya et al., 2022). As the primary way of scoring, shooting is the most important technical element in competitive basketball (Erčulj & Štrumbelj, 2015; Sanjaya et al., 2022; Vencúrik et al., 2021).

Therefore, basketball players are required to have good shooting accuracy to be able to score as many points as possible and outperform opponents. Shooting requires precision to put the ball into the basket, which makes it complex and challenging (Jing, 2023; Sirnik et al., 2022). A slight mistake in making a shot can lead to an unsuccessful shot. There are many factors, technical and non-technical, that can increase the success rate in shooting, and all of them must be mastered well. In addition to accuracy, athletes are required to always be consistent in very dynamic game situations. Basketball players need to be consistently accurate in every game. It is unlikely that shots will always go in, but a good and consistent percentage of success is needed by every shooter in basketball games.

Basketball players need to be introduced to the BEEF concept method early on to have good shooting skills (Anti & Supriyadi, 2021; Cahya et al., 2021; Ramadhan & Irawan, 2022; Vinet & Zhedanov, 2011). BEEF is an abbreviation for balance, eye, elbow, and follow-through, which is a method of shooting practice that uses biomechanics to make it easier for athletes to understand and master good and correct shooting techniques. Previous studies have discussed the importance of shooting form (Kuhlman & Min, 2021), visual attention (Oudejans et al., 2012; Sirnik et al., 2022), balance (Cahya et al., 2021; Jing, 2023), and wrist flexion or follow-through (Aksovic et al., 2020; Caseiro et al., 2023; Cong & Endozo, 2022; França et al., 2021), each of which influences shooting results. Even though there are other factors in shooting success, such as anaerobic contribution (Zamzami et al., 2020), and in some rare cases there are athletes who have a good shooting percentage with a shooting form that does not correspond with the BEEF concept, most of the "great shooters" have a perfect BEEF shooting motion. Therefore, it is very important to improve the shooting form which corresponds with the BEEF.

One of the problems for female basketball players, especially in Palembang City, Indonesia, is limited facilities and infrastructure. Previous studies discussing sports facilities and infrastructure of schools in Palembang City and nearby areas (Asad et al., 2020; Nugraha et al., 2022; Rendi et al., 2023), do not show differences in the size of balls, they only show the number of balls available because usually the balls available are the same size. The ball, which is usually only size 7 for both male and female students in school, and the basketball hoop that cannot be adjusted in height to the age of the player, cause the coach to let the female player shoot without the correct mechanics, just so that the ball can reach the hoop. These compelled the coaches and researchers in Indonesia to focus on strength training to make the players strong enough to shoot the ball instead of focusing on the shooting mechanics (Etin et al., 2023; Amri & Supratman, 2023; Jannah et al., 2024). The players tended to preserve the incorrect shooting form, which led to the inconsistency of their shooting accuracy.

Yan et al. (2023) emphasised that an individualised approach in women's sports training is crucial for enhancing specific skill sets, particularly technical skills like shooting. A one-size-fits-all training programme may hinder optimal progress in shooting abilities, a critical skill in basketball, as it fails to address the unique mechanical issues each player may face. By contrast, individualised training that targets specific mechanical weaknesses allows for a more effective and efficient improvement in shooting performance (Komotska & Sushko, 2022). This approach not only respects each player's unique physical and technical profile but also aligns with the principles of specificity and individuality highlighted in foundational sports training studies (Fox et al., 2017). Therefore, a shift towards more tailored training programmes is essential for female basketball players in Palembang to reach their full potential.

Most of the coaches in Palembang did not receive proper training or education and depended more on their experience. Some of the coaches did not even understand the BEEF as a concept, only knew what it stood for. As a result, basketball players, at the senior level, have poor shooting mechanics and have an impact on low shooting accuracy percentage. In addition, trainers usually only notify shooting errors and use the rep method to improve accuracy without any assistance or further efforts to improve shooting accuracy. This study aims to analyse the comparison between the effect of personalised shooting drills and group repetition training in shooting practice. The BEEF concept was implemented in training with two different approaches to coaching, which are the personal approach and the general approach.

METHOD

Type of Research

This research utilised a quasi-experimental design known as a one-group pretest-posttest design. In this control group design, subjects were selected and divided into two groups at random, and then both groups were given a pretest. In this study, only the experiment group received the intervention.

Participants

30 female basketball athletes aged 17-21 (19.14 ± 1.18) were selected as the research sample; 15 athletes were included in the treatment group and 15 others were included in the control group, while group division used ordinal pairing based on the results of the pretest. All samples in this study were basketball athletes involved in the 2021 South Sumatra Provincial Sports Week.

Instrument

The three-point shot (3PS) test has been used in a recent study (Gou et al., 2022), and consisted of 10 consecutive 3PS (2 consecutive shots from the two corners, the two wings, and the point guard position) with an official basketball (Molten BG4500 size 6, ± 570 g).

Research Procedure

The treatment for the experimental group was personalised training with the assistance of the coaches or representatives. Each coach handled a maximum number of 3 players who were trained individually at different training times. Before the training programme, a shooting mechanics video of each player has been taken and assessed by the head coach. The coaches had been given guidance by the head coach about what BEEF concepts needed to be fixed for each individual before each training and reported the progress of shooting mechanics via video at the end of every practice. This training is carried out for 12 weeks with 1 to 2 trainings a week outside the team training schedule, where each player has to undergo 16 trainings. Meanwhile, the control group were given treatment in the form of shooting repetition practice accompanied by only 1 coach for all players (min. 200 shots per training). Both trainings aim to improve shooting mechanics with the ultimate target of improving shooting accuracy. At the end of the study, both groups were given a posttest to measure the degree of change in each group. The subject of this study is female athletes who were eligible to play for Palembang City and compete in the 2021 South Sumatra Provincial Sports Week.

Table 1. Research Procedure

Groups	N	Number of Weeks	Coach	Number of Shots
Experement	15	12	One coach for three players maximum	> 200/training
Control	15	12	One coach for all players	

Data Analysis

The percentage of successful shots was calculated: (number scored / 10) x 100 (Ardigo et al., 2018). Data analysis was carried out using dependent and independent t-tests and descriptive statistics. Data analysis was carried out using SPSS v26 to generate the tabulation and statistical analysis at a significance level of 5%.

RESULTS AND DISCUSSION

The following Table 1 contains the descriptive statistics of the pretest, which was carried out before the treatment, and the posttest after the 12-week training program and analysed using Ms. Excel.

Table 2. Descriptive Statistics of Research Data

	Treatment			Control		
	Age	Pretest	Posttest	Age	Pretest	Posttest
Mean	19.27	17.60	51.33	19.07	17.33	32.80
Max	21	28	66	21	26	44
Min	17	10	36	17	10	26

	Treatment			Control		
	Age	Pretest	Posttest	Age	Pretest	Posttest
St. Dev.	1.10	6.01	9.19	1.28	4.12	5.12

Based on Table 1, the results of the data analysis show that the average in the pretest in the experimental group is 17.60, with a standard deviation of 6.01, while the average in the posttest in the experimental group is 51.33, with a standard deviation of 9.19. Meanwhile, for the control group, the data obtained was lower than the experimental group; namely, the average pretest score was 17.33 with a standard deviation of 4.12, and the posttest average was 32.80 with a standard deviation of 5.12. To test whether there was a difference after being given treatment in the form of personalised training in the control group, a paired sample test was carried out with the following results:

Table 3. Experimental Group Difference Test

	Posttest	Pretest
Observations	15	15
Pearson Correlation	0.35	
df	14	
t Stat	14.46	
P(T<=t) two-tail	0.000	
t Critical two-tail	2.14	

Based on Table 2, tcount is 2.14 with a Sig value. 0.000 < 0.005, so it means that there is a difference in pretest and posttest data. Meanwhile, to find out the difference between the training results and the control group, an independent sample test was carried out between the post-test data from the control group and the experimental group.

Table 4. Difference Test between Experimental Group and Control Group

	Posttest	Posttest
Observations	15	15
Pooled Variance	55,27	
df	28	
t Stat	6,82	
P(T<=t) two-tail	0,000	
t Critical two-tail	2,04	

Based on Table 3, the count is 2.04 with a Sig value of 0.000 < 0.005, so it means that there is a disparity in data between the control group and the experimental group. This was supported by the average value of the two groups, the experimental group average (51.33) > control group (32.8). Personalised training in basketball has shown significant benefits, as evidenced by studies focusing on coach effectiveness training (CET) principles (Cruz et al., 2016). While NBA players are the best basketball players in the world, they usually hire personal trainers in the off-season to improve their physical, technical, and/or psychological abilities. This shows that individual training is something that is needed to improve basketball players' abilities in addition to general team training. Individual and group training is needed to improve the abilities of basketball athletes, although each type of training has different purposes and results. The results of this study show that both trainings had a positive impact on the shooting ability of female basketball athletes in Palembang city, but personalised training provides better results than regular group repetition training. The average value of the experimental group is 51.33; meanwhile, the control group's is 32.8.A previous study shows the differences between male and female basketball athletes (Mancha-Triguero et al., 2021). Moreover, in the context of female athletes, sports medicine faces many issues. With a growing understanding of exercise-induced cardiovascular changes in athletes, particularly female athletes, specialised care and consideration of female cardiac adaptations are required (Patel et al., 2022). In addition, managing the health and performance of female athletes has become more difficult due to overlooked gynaecological issues, amenorrhoea, and associated menstrual symptoms, as well as a lack of medical information about pregnancy (Nose-Ogura,

2021). In addition, the growing field of women's sports medicine emphasises the importance of improving knowledge about injuries, their treatment, and outcomes specific to female athletes, such as preventing injuries and concussions (Tanaka 2019). Therefore, individuality and specificity in training are required.Personalised coaching in basketball, as highlighted in various studies (Barrera-Domínguez et al., 2023; Kohda et al., 2018), involves personalised attention and tailored guidance to improve individual player skills, focusing on specific needs and areas of improvement. This method allows for in-depth feedback, precise skill development, and the opportunity to address individual challenges effectively. Additionally, personalised e-coaching has been proposed as a method to promote positive changes in personal habits for a healthy lifestyle, utilising persuasive techniques and personalised recommendations based on individual preferences and interests (Zemko et al., 2022). These findings collectively highlight the effectiveness of personalised coaching approaches in basketball and other domains, showcasing the potential for improved athlete well-being and performance through individualised support and guidance. On the other hand, group basketball training, as discussed in the literature (Losch et al., 2016), emphasizes collective learning, teamwork, and communication among players.

Research by Hauri and Vučetić highlights the importance of recognising group activities in basketball through deep learning approaches like NETS, which efficiently model player relations and strategies (Hauri & Vucetic, 2023). Additionally, Nacif's work underscores the benefits of group coaching, suggesting that it is scalable and cost-effective and promotes collective understanding, making it a valuable tool for player development and team cohesion (Nacif, 2023). Furthermore, Hu, Yang, and Xue's study introduce a group learning approach to analyse shot selection heterogeneity among NBA players, emphasising the significance of understanding individual and group dynamics in basketball performance (Hu et al., 2021). By focusing on group activities, coaching, and player interactions, basketball training can enhance teamwork, communication, and overall team performance. Group training sessions are often more cost-effective, promote collaboration, and enhance team dynamics. While one-on-one coaching enhances individual performance and skill mastery, group training fosters teamwork, coordination, and shared understanding among players, contributing to overall team success on the basketball court.The research papers provide valuable insights into various shooting practice methods in basketball. Personalised shooting drills, as seen in the study by Cong and Endozo (Cong & Endozo, 2022), emphasise physical fitness, coordination, and psychological aspects to improve shooting success. On the other hand, group repetition training, such as the zig-zag and fixed ball methods studied by Purwanto focuses on enhancing shooting accuracy through specific practice techniques (Purwanto, 2022). Additionally, biomechanical analysis, as discussed by Hamza (2023) highlights the importance of competitive exercises in developing shooting accuracy based on biokinematic variables. Furthermore, Radenković et al. (2022) demonstrate the positive impact of combining plyometric and shooting training on explosive power during jump shots. Lastly, Gou et al. (2022) emphasise the significance of shooting aiming points on field goal percentage, showing that targeted practice can lead to improved shooting accuracy over time. This research only focused on training results by paying attention to accuracy results, while other factors were not observed and assessed. This drew the interest of researchers because there were players with quite significant positive results even though they were in the control group. Factors such as basketball IQ, psychology, nutrition, or other factors in their influence on shooting practice results were not included and can be investigated further in future studies.

CONCLUSION

Personalised training in basketball has shown significant benefits, although both individual and group training have different purposes and results. The results of this study show that personalised training has better results in shooting accuracy, which means that shooting mechanics need to be trained individually. It can be concluded that personalised training is better than group/team training in improving basketball shooting mechanics, which leads to increasing shooting accuracy. This research only focused on training results by only paying attention to accuracy results, while other factors such as basketball IQ, psychology, and nutrition were not observed and assessed. Future studies can investigate more factors, such as basketball IQ, that might accelerate the athletes' process of understanding in improving shooting mechanics and influence the results of personalised training.

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CONFLICT OF INTEREST
No potential conflict of interest was reported by the author(s).

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