



The Use Of Eye And Hand Coordination Analysis Approach To Shooting Accuracy In The Sport Of Petanque: A Systematic Review

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Abstract

The purpose of this study was to determine how hand eye coordination analysis can provide accuracy in petanque shooting techniques. This review study followed PRISMA standards for systematic reviews and meta-analyses. Studies had to be published within the previous five years, from January 2020 to July 2024. This review consists of nine studies. In four research articles, it focuses on analyzing hand eye coordination on petanque shot results. Five articles were about accuracy training to improve petanque shot accuracy. This article presents an analysis of hand-eye coordination. Analyzing hand-eye coordination helps players understand how power, speed and posture affect shots, helping players achieve more accurate shots.

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INTRODUCTION

The sport of petanque involves using iron and wooden balls to play, with a focus on techniques such as pointing and shooting (Isdarianti et al., 2022). The sport of petanque attracts interest from a wide range of individuals, with some showing low to very high levels of interest in the sport. This study highlights the importance of understanding the intrinsic and extrinsic interest aspects of the sport of petanque to attract more participants and increase competence in the sport (Sahrani et al., 2023). The results of another study stated mental aspects such as imagery and self-talk play an important role in improving the performance of petanque athletes, with athletes benefiting from utilizing these techniques to improve their mentality during competition (Jannah et al., 2023). Evaluating the success and development of the sport of petanque involves considering factors such as context, input, process, and product, with assessments indicating areas of improvement in achieving optimal performance levels in the sport (Ashari & Yulianti, 2022). Overall, petanque is a sport that requires a combination of physical skills, mental focus, and strategic gameplay to excel competitively (Nasution et al., 2023).

Hand-eye coordination plays an important role in sports performance, as evidenced by numerous studies. Eye-hand coordination is an important skill that involves synchronizing visual input with hand movements (Ujbányi et al., 2020). Research has shown that coordination training can significantly improve the eye-hand coordination of young athletes (Bhukar, 2023). Research has consistently shown the importance of eye-hand coordination in sports performance. Another study found that

volleyball players demonstrated superior eye-hand coordination compared to non-players (Irem & Mohammad, 2020). The results of the study extended the discussion to include a range of sports, identifying significant differences in hand-eye coordination among athletes. These studies collectively highlighted the important role of eye-hand coordination in sports and the potential for technology-enhanced training (Grigore et al., 2012). Various studies have explored the application of hand-eye coordination to petanque shooting throws. The ability of the hand to hold a function while the eye executes a specific movement is known as hand-eye coordination. In this example, both eyes will detect when the ball reaches a given point, allowing the hand to receive and release petanque shots instantly. From various studies emphasizing the importance of eye-hand coordination in determining shot accuracy, this coordination involves complex interactions between the eyes and hands, with both contributing to visually guided movements (Kurniawan et al., 2022). The execution of such movements, such as target pointing in petanque, requires accurate spatial coding and motor control, in normal situations, the vision of hand movements (called reafference) and the target will allow correcting the motor program if it is not accurate (Arora et al., 2019). In addition, factors such as togok flexibility, static balance, and eye-hand coordination have been studied to understand their impact on the shooting outcomes of petanque athletes, highlighting the complexity of physical factors that influence performance (Permadi & Nurhidayat, 2021). Furthermore, studies have investigated the direct and indirect effects of hand-eye coordination,

concentration, and confidence on shooting accuracy in petanque athletes, shedding light on the multifaceted nature of skill development in the sport (Purnomo, 2020). Findings suggest that improving hand-eye coordination through specific exercises may lead to improved shooting skills in petanque athletes, ultimately contributing to better overall performance in the sport.

Various studies have explored different types of drills to improve petanque accuracy. One study focused on the impact of accuracy training on the shooting outcomes of petanque athletes, showing significant improvements post-training (Badaru, Kasmad, et al., 2021). Exercise programs, such as accuracy training, have been found to significantly improve shooting outcomes in petanque athletes, especially in the 15-20 year age group (Phytanza et al., 2022). Furthermore, a study analyzed the pointing accuracy of petanque athletes, highlighting the importance of mastering basic techniques for optimal performance (Irawan et al., 2022). In shooting, the mental readiness factor of a petanque player must also be good, because good mental readiness will be able to influence affect the concentration of playing and the optimal accuracy of a petanque player's shot (Syahputra et al., 2021). In addition, tools such as the modified Duo Tir have been developed to effectively improve shot accuracy, offering a valid and reliable alternative for training the accuracy of petanque athletes (Lubis et al., 2023). Factors such as wrist flexibility have also been linked to shooting ability, emphasizing the importance of physical elements in controlling the petanque ball (Supandri, Sarwita, Tuti, 2020). Overall, using specialized tools and training programs can

lead to important improvements in the accuracy of the sport of petanque, benefiting athletes in their competitive endeavors. Numerous research projects in the past have improved petanque sports shooting accuracy in a number of ways, including the creation of a model for training petanque sports shooting skills (Sutrisna et al., 2018), android-based petanque sports module (Wulandari & Wibowo, 2022), Learning Media Video Tutorial Basic Petanque Throwing Techniques (Ayu et al., 2022)

The major goal of examining hand-eye coordination in relation to petanque shot accuracy is to identify movement and ball motion errors that result in optimal movement, identify technique execution errors that result in complete and accurate execution, and produce athletes with the potential to win championships, particularly in matches. Games of petanque are among the sports that strive for optimal accuracy and superb coordination. This implies that in order to score the winning points, the throws must land on specific objectives. Because of the accuracy-based nature of petanque, players of any age, gender, or position are welcome to participate in this activity. According to the primary goal of petanque, which is to get the highest level of precision possible,

METHODS

The words “Hand eye coordination analysis”, and “shot accuracy” and “Petanque sport” were searched for in articles published from Sinta (Science and Technology Index) and Scopus Collection (Science Citation Index Expanded. Social Science Citation Index. Arts & Humanities Sams Citation Index) from 2020 to 2024.

As shown in the flow chart (Figure 1), a total sample of 9 articles was obtained from a total of 137 articles by following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines.(Moher et al., 2015) during identification, suitability screening, and inclusion phases

Systematic reviews, meta-analysis, abstracts and books were excluded. Eligible articles were studies, whether theoretical, descriptive or experimental, that used petanque sport athletes as samples and addressed topics such as the analysis of hand-eye coordination that may affect competition and the use of accuracy drills to improve shot accuracy in the face of competition. Both qualitative and quantitative articles were considered.

The following variables were taken into account in the literature review (a) Annual trend of articles published between 2020 and 2024 (b) distribution of publications, first author institutions (c) number of authors (d) field of study (training, health, other educational management or mixed) (e) type of study (experimental, descriptive correlational, lamnya) and (f) average number of citations per article.

Focus was placed on the abstract, article title, and keywords because these elements were sufficient to provide accurate and useful excerpts of the article for additional research. The authors of this review study did not wish to exclude anyone who could not access their research, thus they only included open access publications in their analysis. The subsequent inclusion and exclusion criteria were employed to choose solely pertinent papers that tackled the aforementioned subjects

RESULTS AND DISCUSSION

Various time periods can be seen in the evolution of the number of publications, as depicted in Figure 2 First. there has been a marked increase in scientific output from 2020 (50 articles). Then in the following year there was a decrease in 2021 (10 articles) in the year there was an increase in 2022 (22 articles) in the following year there was an increase in 2023 (30 articles) and in the following year 2024 (25 articles). This resulted in a final sample of 9 relevant articles. Specifically, 4 articles focused on analyzing hand eye coordination on petanque shot results and 5 articles on accuracy training to improve petanque shot accuracy.

Table 1 presents an overview of the characteristics of studies focusing on the role of hand eye coordination in the sport of petanque (authors, objectives, sample, methods and results).

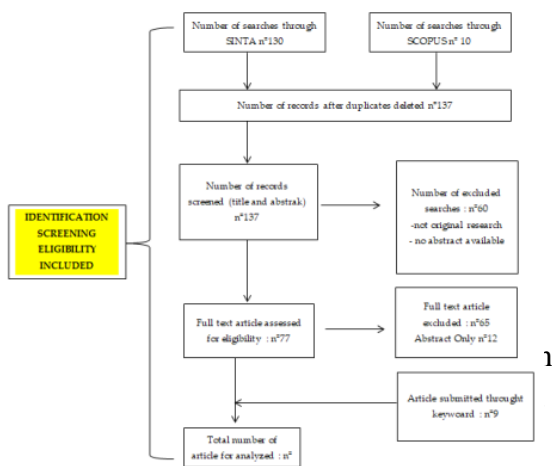


Table 1. The role of hand eye coordination

Author	Objective	Sample	Method	Results
(Nurfatoni & Hanief, 2020)	Knowing how much hand eye coordination contributes to petanque shots	Mean age 15.4 ± 7.6 years	Quantitative descriptive	Eye-hand coordination contributes positively to petanque shots
(Mokhamad Raynaldo Dwiki Fahrizal et al., 2023))	Focus on improving shooting game coordination	14 athletes	Correlation Method	The level of accuracy of shooting petanque games can be increased proportionally with an increase in hand eye coordination.
(Lubis & Permadi, 2021)	Knowing the comparison between concentration training and coordination training on the improvement of game shooting ability	14 athletes	Experimental study	There is a significant effect of concentration training and coordination training on the improvement of shooting game ability.
(Arsi Rabani, 2021)	Knowing the relationship between hand eye coordination and pointing game ability	16 students	Quantitative method Correlational approach	There is a relationship between hand eye coordination and the ability of pointing game in college students

Table 2 presents an overview of the characteristics of studies focusing on the role of shot accuracy in the sport of petanque (authors, objectives, sample, methods and results).

Table 2. The role of shot accuracy in petanque sport

Author	Objective	Sample	Method	Results
(Badaru, Kasmad, et al., 2021)	Knowing the effect of which training is better, between accuracy training and arm strength training on the results of shooting throws in petanque athletes.	16 students	Experimental study, <i>One-Group Pretest-Posttest Design</i>	There is a significant influence between accuracy training and arm muscle strength on shooting throwing skills in Petanque sports.
(Rony et al., 2021)	The study aims to see the effect of mental image on shot accuracy in the sport of petanque.	Athletes as many as 20 athletes	Experimental study, <i>One-Group Pretest-Posttest Design</i>	This study shows that imagery as a fundamental cognitive process to produce motor movements and

				performance improvement is suitable for use by petanque athletes in an effort to improve shot accuracy.
(Syahputra et al., 2021)	Knowing the comparison between concentration training and coordination training on the improvement of game shooting ability	16 athletes, divided into 2 groups of high accuracy and low accuracy	Experimental method with Level 2x2 design, two-way factorial	There is no interaction between training media and playing concentration on the accuracy of Petanque athletes' shots.
(Rizal et al., 2021)	to observe how self-talk, a type of mental training, affects shot accuracy in the petanque game.	20 athletes	Pre-experimental method, <i>One-Group Pretest-Posttest Design</i>	The study's early and final statistics, which demonstrate an increase in shot accuracy outcomes, demonstrate that mental self talk training improves petanque shot accuracy.
(Sari et al., 2023)	Improve the skills of Sragen Regency athletes in shooting accuracy	NA	Discussion Study	This activity found the answer that the athletes' shot accuracy skills improved better, even though in previous activities they had understood and mastered the basic petanque shot technique material.

The table above displays hand-eye coordination strategies that can be used in petanque shooting throws based on a review of the literature. There are nine studies in the review. The investigation of hand-eye coordination is covered in four research articles, leading to a discussion of gaze direction and appropriate hand movements. Four research articles analyze shooting accuracy in petanque, leading to a discussion

of focus, angle, direction, and arc. The primary objective of petanque throwing hand-eye coordination analysis is to develop precision in both throwing and shooting.

The backswing angle, swing speed, and release angle are the three indicators that determine the outcome of the shooting throw action. If the backswing angle and release angle are minimal, a considerable swing speed is required to reach the target at a

distance of eight meters. (Sinaga & Ibrahim, 2020). According to what has been said, if the backswing angle and release angle are large, the necessary swing speed to reach the target at a distance of 8 meters is likewise small. (Cahyono et al., 2018). Due to their interdependence, these three indicators have an impact on the outcomes of throwing throws; if one sign is more prominent than the others, other indicators must change as well. Considering that the collection of shooting precision samples placed them in the "medium" category with an average score of 19.6, more shooting practice is required to get the best results.

Numerous research works have investigated the elements that affect petanque shot accuracy. Shot accuracy is greatly influenced by eye-hand coordination, focus, and confidence. Additional evidence of the efficiency of shooting exercises with obstacles in enhancing shooting game abilities (Saifulamri Alkhusaini et al., 2021). According to additional research, creating a petanque shooting instruction model for novices and stressing the value of practice in order to attain high throwing accuracy (Badaru, Hasmyati, et al., 2021). Then, another study's findings comparing the benefits of coordination and concentration training on shooting game abilities revealed that while both were significant, concentration training produced superior outcomes (Lubis & Permadi, 2021). All of these studies show how crucial hand-eye coordination and physical training are to reaching shot accuracy in petanque. You may intelligently arrange your practice sessions to maximize your training in the least amount of time and in the safest manner possible by using hand-eye coordination analysis..

A player or athlete will have good hand-eye coordination, if he can direct the ball in the direction he wants. Hand-eye coordination also requires dynamic vision, which is the ability to see clearly while following the movement of the body when the body position is low and leaning forward from standing to perform the movement. (Widodo & Hafidz, 2018). Other studies have highlighted the importance of hand-eye coordination, balance and concentration in improving the shooting skills of petanque athletes. Furthermore, this study emphasizes the need to assess and improve hand-eye coordination to improve shot accuracy in petanque competition. (Sani & Hulfian, 2022). Therefore, developing and maintaining strong hand-eye coordination is essential to achieve optimal performance in the game of petanque.

Accuracy in sports includes various aspects such as performance prediction, timing equipment, monitoring evaluation, and information extraction. Research shows that accurate sports performance prediction can be achieved through BP neural networks, with high correlations found between certain physiological parameters and performance. (Yang & Luo, 2022) In addition, a study focusing on pass aids for basketball athletes emphasized the importance of tools to improve pass accuracy during training sessions. (Ramadani & Supriadi, 2022). Other studies have shown that hand-eye coordination training interventions can improve shooting accuracy in the sport of petanque. The research suggests that hand-eye coordination training is suitable for petanque athletes who have shooting accuracy, as evidenced by its use by the world's elite athletes (Rizal et al., 2021)

This review has some limitations. No studies directly investigated the relationship between hand-eye coordination and petanque shot accuracy. Many of the included studies had small sample sizes, measured different outcomes, and were not experimental, making it difficult to conduct a meta-analysis. The search strategy can only be found in English and Indonesian articles besides only. Future research should concentrate on this section as the number of articles collected seems limited. However, the fact that this literature only discusses studies that address shots involved in the sport of petanque, rather than the sport of petanque in general with other basic techniques being more widely discussed. In terms of the sport chosen, the research is very specific and selective. To date, there is no old research that addresses this topic

CONCLUSION

The analysis of hand-eye coordination in petanque shooting accuracy is based on literature and research. Four articles focused on coordination analysis, examining the direction and suitability of throws in petanque shooting. Other articles discuss shooting accuracy training, focusing on accuracy, area, distance and focus. An analysis of hand-eye coordination is presented in this text. This study focuses on the importance of coordination, consistency and accuracy in petanque shooting. The analysis of hand-eye coordination helps understand the impact of intensity, speed, and posture in shooting and helps players get more accurate shots. The study concludes that analyzing hand-eye coordination against effective accuracy is critical to improving shooting performance, as demonstrated by professional athletes

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