

Comparative analysis of archers' shooting performance scores by gender

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Abstract

Empirical evidence regarding gender differences in archery shooting performance remains inconsistent. This study aims to compare shooting performance scores between male and female archers. A comparative cross-sectional design was employed, involving 35 archers consisting of 16 males and 19 females selected through total sampling. Shooting performance was assessed in a single testing session comprising 36 arrows. The data were analyzed using descriptive statistics, the Shapiro–Wilk test, Levene's test, an independent-samples t-test, and Cohen's d effect size. The results revealed no statistically significant difference in shooting performance scores between male and female archers, $t(33) = -0.920$, $p = .364$. The effect size was small (Cohen's $d = 0.31$), indicating only a minor practical difference between the two groups. These findings suggest that gender may not be a primary factor determining archery shooting performance. Therefore, coaching programs should place greater emphasis on athletes' individual abilities and performance characteristics rather than relying solely on gender-based considerations.

Keywords: archery; gender; shooting performance; shooting score; archers

INTRODUCTION

Archery is a precision sport that demands the integration of technical ability, postural stability, neuromuscular coordination, and psychological regulation to produce accurate shots (Zawi & Mohamed, 2013). In contrast to sports that rely more on strength or speed, archery athlete performance is more determined by the ability to maintain consistency of movement during the aiming process until the release of the arrow (Vendrame et al., 2024). Therefore, shooting scores are a commonly used objective indicator to evaluate athlete performance in training sessions and competitions (Syahidan, 2025).

In recent decades, the participation of male and female athletes in archery has shown an increasingly equal development. At the 2024 Paris Olympics, archery was attended by 128 athletes consisting of 64 male athletes and 64 female athletes (International Olympic Committee, 2024). Although the opportunity to compete is given in a balanced manner, equality of participation does not necessarily reflect equality of performance. This condition shows the importance of empirical studies on differences in shooting performance based on gender as a basis for performance evaluation and the preparation of athlete coaching programs.

Shooting performance in archery is influenced by various factors. From the biomechanical aspect, postural stability is closely related to shot accuracy because the ability to maintain body balance contributes to the consistency of arrow release (Sarro et al., 2021). From the psychological aspect, self-confidence and ability to focus are reported to be related to increasing shot accuracy (Izzah & Setyawati,

2023), while competitive anxiety can reduce the quality of performance during matches (Jannah, 2017). These findings indicate that archery performance is the result of the interaction of various physical factors,

biomechanics, and psychology. However, the gender contribution to the shooting performance score still requires empirical proof through comparative research.

Research on the relationship between gender and archery performance still shows mixed results. Sarro et al., (2021) reported that differences in performance between male and female athletes were not always seen in overall match scores. In Indonesia, archery research focuses more on psychological aspects, such as self-esteem, self-efficacy, motivation, and mental readiness of athletes, while international studies also place psychological factors as an important part of overall archery performance (Vendrame et al., 2024). However, research that directly compares shooting performance scores between male and female athletes is still relatively limited, especially in the context of coaching athletes at the club, school, and regional levels.

The limitations of the empirical evidence indicate the need to evaluate whether gender is related to differences in shooting performance scores between archers. This information is important as the basis for preparing a more objective and evidence-based coaching program, so that performance evaluation is not solely based on assumptions about differences in abilities between male and female athletes.

Based on this description, this study aims to compare shooting performance scores between male and female archers. The results are expected to enrich the study of archery performance analysis and provide scientific information that supports the development of evidence-based athlete coaching strategies.

METHODS

This study employs a quantitative approach with a comparative design through a cross-sectional approach. Data collection was carried out in July 2026 at Selabora Archery, Faculty of Sports and Health Sciences (FIKK), Universitas Negeri Yogyakarta. The sample was selected using a total sampling technique and involved 35 active archers, consisting of 16 male athletes and 19 female athletes.

Inclusion criteria include male and female archers who were active in training, had at least three months of training experience, were willing to participate all research procedures, and provided written informed consent. Athletes with shoulder, arm, wrist, or back injuries who were not present at the time of data collection, or did not complete the entire set of tests were excluded from the study.

The independent variable in this study is gender, while the dependent variable is the shooting performance score. Performance measurement was carried out through one test session using standard bow (national division) in accordance with the provisions of the Indonesian Archery Management (Perpani). Each athlete shot at one shooting distance according to the category of the competition (10 m, 20 m, 30 m, or 40 m). Each session consisted of 36 arrows divided into 6 ends, with each end consisting of 6 arrows. The shooting was carried out using the standard face target of the national division in accordance with the provisions of the Perpani. The score of each arrow was determined based on the official rating system of Perpani according to the position of the arrow in the target field, then summed to obtain the total score of each athlete's shooting performance.

The data were recorded using a shooting score recording sheet that contained the athlete's identity, gender, each arrow's score, and total score. Data analysis was carried out using IBM SPSS Statistics version 26 through descriptive statistics, Shapiro-Wilk normality test, homogeneity variance test using Levene's Test, and independent-samples t-test at a significance level of 0.05. The amount of gender influence on the shooting performance score was calculated using Cohen's *d* as an effect measure.

For experimental research, the type of design (experimental design) used should be written in this section. The types of data, how they were collected, the instruments by which they were collected, and how they were technically collected, are clearly described in this section.

How to interpret the data obtained, its relation to the problem and the purpose of the research, needs to be clearly explained.

(Note: The sub-chapters can differ, according to the type or approach of research used. If there are sequential procedures or steps, they can be notated (numbers or letters) according to their position).

RESULTS AND DISCUSSION

Results

The analysis began with descriptive statistics to describe the distribution of shooting performance scores based on gender, then continued with normality assumption testing and difference testing using independent-samples t-test.

Table 1. Descriptive Statistics of Shooting Performance Scores by Gender

Gender	n	Mean	SD	Minimum	Maximum
Male	16	254.63	54.43	116	327
Female	19	271	50.77	145	335

The shooting performance scores in both groups showed a relatively similar pattern. Although the average score of female athletes was higher than that of male athletes, the variation in scores in both groups was still in a comparable range so that it did not indicate a clear difference in performance based on gender.

Table 2. Shapiro-Wilk Normality Test Results

Gender	Statistics	Sig.
Male	0.925	0.206
Female	0.929	0.163

Normality test results showed that the distribution of scores in both groups met the assumption of normality ($p > 0.05$), so that parametric analysis could be used to test the difference in shooting performance scores based on gender.

Table 3. Independent-Samples t-Test Results

Variable	t	df	Sig. (2-tailed)
Shooting performance score	92	33	0.364

Independent-samples t-test results showed that there was no significant difference in shooting performance scores between male and female archers ($p > 0.05$). The effect size value (Cohen's $d = 0.31$) indicates that the gender influence on the shooting performance score is small.

Discussion

This study shows that gender is not significantly related to shooting performance scores between archers. These findings indicate that the difference in scores between male and female athletes in this study is relatively small and has no strong statistical or practical significance.

Archery characteristics that emphasize accuracy, consistency of technique, and movement control allow athlete performance not to be solely determined by biological characteristics. In this context, the ability to produce accurate shots is the result of the interaction of various aspects that support performance during the process of aiming and releasing arrows.

The findings of this study are in line with Li and Zhao, (2024), who reported that differences in performance between male and female archers were not always reflected in overall match scores. These results indicate that gender is not the only factor related to shooting performance, so interpretation of performance differences needs to be carried out more comprehensively.

Previous studies have shown that archery performance is related to technical quality, postural stability, and psychological factors such as self-confidence, concentration, and competitive anxiety (Santos et al., 2025; Wang et al., 2022; Diotaiuti et al., 2021). Variations in performance in this study are thought to be related to these factors. However, these variables were not directly measured; thus, the causal relationship cannot be concluded and still requires further research.

The effect size value in the small category reinforces that the gender contribution to the variation in the shooting performance score is relatively low. This finding has practical implications that performance evaluation and the preparation of archery athlete coaching programs should be more oriented to improving individual abilities, especially technical aspects, than approaches based solely on gender (Li & Zhao, 2024).

Our research has several limitations. Performance measurements were carried out once (single-session assessment) so that the results obtained represented the condition of the athletes at the time of data collection. In addition, the study has not considered other variables that have the potential to affect performance, such as training experience, age category, and biomechanical and psychological

characteristics of athletes. Therefore, subsequent studies are recommended to use a longitudinal design or repeated measurements involving these variables to obtain a more comprehensive understanding of the determinants of archery athlete performance (Jacquot et al., 2025).

CONCLUSION

There was no significant difference in shooting performance scores between male and female archers. This finding shows that gender is not the main determinant of shooting performance in archers in this study.

The implications of research lead to the importance of preparing coaching programs that are oriented to improving individual abilities, especially technical aspects and factors related to performance, compared to approaches based solely on gender. Further studies are recommended to involve a larger number of samples, use repeated performance measurements, and consider other variables, such as training experience, age category, arc type, and biomechanical and psychological characteristics, to obtain a more comprehensive understanding of the determinants of archery athlete performance.

REFERENCES

- Committee, I. O. (2024). *Paris 2024: The first Olympic Games to achieve full gender parity*. Olympics.Com.
- Diotallevi, P., Corrado, S., Mancione, S., Falese, L., Dominski, F. H., & Andrade, A. (2021). An exploratory pilot study on choking episodes in archery. *Frontiers in Psychology*, 12.
- Izzah, A., & Setyawati, H. (2023). Pengaruh Latihan Self-talk Positif untuk Meningkatkan Kepercayaan Diri terhadap Akurasi Memanah (Atlet Panahan PERPANI Kudus). *Indonesian Journal for Physical Education and Sport*, 4, 143–149.
- Jacquot, R., Ben Mansour, K., Bouillet, K., Jehl, J.-P., & Gauchard, G. (2025). A multi-parameter investigation of elite archery: distinguishing individual and shared performance strategies during the aiming and follow-through phases. *Frontiers in Sports and Active Living*, 7.
- Jannah, M. (2017). Kecemasan dan konsentrasi pada atlet panahan. *Jurnal Psikologi Teori Dan Terapan*, 8(1), 53–60.
- Li, C., & Zhao, Y. (2024). Gender differences in skilled performance under failure competitive environments: evidence from elite archers. *Frontiers in Psychology*, 15.
- Santos, J., Barreto, J., Atalaia, T., & Aleixo, P. (2025). Relationship between shooting performance and biomechanical parameters associated with body stability in archery: A Systematic Review. *Biomechanics*, 5(3), 48.
- Sarro, K. J., Viana, T. D. C., & De Barros, R. M. L. (2021). Relationship between bow stability and postural control in recurve archery. *European Journal of Sport Science*, 21(4), 515-520.
- Shahidan, T. (2025). *Hubungan VO₂ max dan konsentrasi terhadap akurasi tembakan atlet panahan Universitas Negeri Jakarta*. Universitas Negeri Jakarta.
- Vendrame, E., Belluscio, V., Truppa, L., Rum, L., Lazich, A., Bergamini, E., & Mannini, A. (2024). Performance assessment in archery: a systematic review. *Sports Biomechanics*, 23(12), 2444-2466.
- Wang, D., Hu, T., Luo, R., Shen, Q., Wang, Y., Li, X., Qiao, J., Zhu, L., Cui, L., & Yin, H. (2022). Effect of cognitive reappraisal on archery performance of elite athletes: The mediating effects of sport-confidence and attention. *Frontiers in Psychology*, 13.
- Zawi, M. M., & Mohamed, A. (2013). The assessment of postural control mechanisms in three archery disciplines: A preliminary study. *Pamukkale Journal of Sport Sciences*, 4(3), 18-28.