

Preserving Heritage, Advancing Practice: A Systematic Review of Traditional Archery Practices, Innovation, and Performance

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Abstract

Traditional archery is both a sport and a cultural heritage that has evolved over centuries across various civilizations. This Systematic Literature Review (SLR) synthesizes research on traditional archery training, focusing on historical practices, modern innovations, and performance factors influencing archers. Using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology, 32 peer-reviewed articles published between 2020 and 2024 were screened and analyzed from Scopus and Web of Science (WoS) databases. The findings are categorized into three themes: (1) Historical and Cultural Aspects of Traditional Archery, (2) Training Methods and Technological Innovations, and (3) Psychological and Physiological Factors Affecting Performance. Results reveal that blending historical practices with modern technologies, such as biomechanical analysis systems and cognitive training devices, enhances training precision while preserving tradition. Psychological factors, including stress management and focus, significantly impact archery performance, while physiological considerations, such as neuromuscular control and hormonal responses, further optimize outcomes. This review highlights the need for a holistic approach, integrating cultural heritage with contemporary methods to foster skill development and injury prevention. Thus, by bridging traditional practices with modern advancements, this study emphasizes the significance of preserving the sport's rich history while enhancing its relevance and effectiveness in the modern era.

Keywords: traditional archery, training methods, cultural heritage, technological innovations, performance factors

1. Introduction

Traditional archery is a practice steeped in history and cultural significance and has evolved from its origins as a means of hunting and warfare to a modern sport that captivates enthusiasts worldwide. The bow and arrow, simple yet sophisticated tools, embody a rich heritage that transcends geographical boundaries, reflecting the diverse cultures that have embraced this ancient skill. In recent years, traditional archery has gained prominence in international competitions, showcasing the technical prowess of archers and the cultural narratives accompanying this sport. Unlike modern archery, which often emphasizes technological advancements in equipment, traditional archery requires a deeper physical engagement. In particular, it demands significant upper body strength and endurance during the draw phase of shooting. This unique aspect of traditional archery has been highlighted in studies examining the muscle forces exerted by archers, emphasizing the physical demands inherent in this practice (Ariffin, 2020).

The cultural dimensions of traditional archery are particularly noteworthy, as they often intertwine with local customs, rituals, and historical narratives. For instance, the influence of Chinese culture on traditional Japanese archery illustrates how cultural exchanges and adaptations over time can shape archery practices. This relationship underscores the complexity of traditional archery as not merely a sport but a vessel for cultural expression and identity (Zeng, 2023). Furthermore, the revival of traditional archery rites within Confucian practices in China demonstrates a concerted effort to reconnect with historical

traditions that have waned in modern times. This reflects a broader trend of cultural preservation and revitalization (Kenderdine et al., 2023).

From a psychological perspective, archery necessitates high mental acuity and emotional control. Research has proven that cognitive reappraisal and sport-confidence significantly influence archery performance, indicating that mental training is as crucial as physical conditioning for success in this discipline (Wang et al., 2022). In addition, the interplay between mental and physical aspects is further emphasized by studies exploring the effects of imagery and self-talk on performance, revealing that psychological strategies can mitigate anxiety and enhance focus during competitions (Yachsie et al., 2023; Isar et al., 2022). This holistic approach to training underscores the multifaceted nature of archery, where both the mind and body must work in concert to achieve precision and accuracy.

In the context of Islamic perspectives on traditional archery, the sport holds a significant place within the cultural and religious practices of Muslim communities. The teachings of the Prophet Muhammad, who advocated for archery as a beneficial activity, have inspired many Muslims to engage in this sport as a means of physical fitness and skill development. The revival of archery as a “Prophet’s sport” in various Muslim communities, particularly in Indonesia, reflects a broader movement to reconnect with traditional practices that align with Islamic values (Sobirin, 2017). Notably, this revival is not merely about physical activity. It also encompasses a spiritual dimension, as engaging in archery is perceived as a way to embody the virtues of discipline, focus, and perseverance central to Islamic teachings (Farooq & Parker, 2009).

Moreover, integrating archery into educational frameworks within Muslim societies highlights its role in promoting physical education and positive youth development. Archery is often viewed as a safe and gentlemanly sport, fostering confidence and camaraderie among participants (Buning et al., 2015). The emphasis on archery as a recreational and competitive activity aligns with the Islamic ethos of promoting healthy lifestyles and physical well-being, further solidifying its place within the cultural fabric of Muslim communities.

Traditional archery, a practice rooted in history and cultural significance, faces challenges in preserving its historical essence while adapting to modern contexts. Despite its resurgence in various communities and its recognition as a sport with physical, psychological, and cultural dimensions, there is limited systematic exploration of how traditional practices, cultural narratives, and contemporary influences intersect to shape its current and future trajectory. Additionally, the role of traditional archery in promoting physical and mental well-being, as well as its integration into cultural and educational frameworks, remains underexplored. Hence, this study aims to explore traditional archery from an academic perspective.

2. Literature Review

Traditional archery is a sport with deep historical roots and has garnered attention for its physical and psychological benefits. Recent studies have explored various aspects of traditional archery training, including its impact on physical fitness, coordination, and mental focus. Accordingly, this literature review synthesizes findings from several studies to provide

a comprehensive overview of traditional archery training while also considering its implications. Research indicates that traditional archery training significantly enhances physical attributes such as hand-eye coordination and upper limb reaction time. For instance, Zolkafi et al. (2018) conducted a study demonstrating a marked improvement in hand-eye coordination among sedentary youth after a four-week traditional archery intervention. Similarly, Ge tli et al. (2021) noted that while the reaction time of participants improved, the statistical significance of the results was not conclusive. These findings suggest that while traditional archery can enhance certain physical skills, the extent of improvement may vary.

Moreover, traditional archery training has been linked to mental focus and concentration improvements. Geng et al. (2023) discovered that engaging in archery practice significantly enhances attention and concentration levels among athletes. This is critical, as archery requires a high degree of mental acuity to achieve precision in shooting. In addition, the psychological benefits extend beyond mere focus. They also encompass stress relief and increased self-discipline, which are essential traits for athletes (Aurani et al., 2022).

Various training techniques have been explored to optimize performance in traditional archery. For instance, the use of balance training methods, such as the bosu ball, has been demonstrated to improve the balance and accuracy of archers (Prasetyo et al., 2023). Additionally, strength training exercises targeting the upper body have been identified as crucial for enhancing shooting accuracy (Noviantoro & Irianto, 2022). The integration of these training methods reflects a comprehensive approach to developing the physical capabilities necessary for successful archery performance.

Furthermore, studies have indicated that specific interventions, such as kinesio taping, can enhance shooting accuracy by improving joint stability (Rajabzadeh et al., 2019). This highlights the significance of not only physical training but also the application of supportive techniques to maximize performance.

The cultural significance of traditional archery is profound, particularly in regions where it has been practiced for centuries. In Islamic culture, archery is a sport and a skill historically valued for its military applications. The Prophet Muhammad emphasized archery as a noble pursuit, and it has been integrated into Islamic teachings as a means of physical training and discipline (Jaelani et al., 2020). This historical context enriches the practice of traditional archery, making it a sport that embodies both physical prowess and spiritual significance.

From an Islamic perspective, traditional archery is viewed as a beneficial activity that promotes physical fitness and mental discipline. The practice aligns with the Islamic ethos of maintaining a healthy body and mind. Thus, engaging in archery can be perceived as fulfilling the Islamic duty of self-improvement and physical and spiritual preparation. The sport encourages virtues such as patience, focus, and perseverance, which are highly regarded in Islamic teachings (Sulastri, 2019). Moreover, the communal aspect of archery training can foster social bonds and community engagement, reflecting the Islamic principle of community welfare. As noted by Jaelani et al. (2020), archery tourism has gained popularity among Muslim communities, indicating a growing interest in integrating traditional sports with cultural and religious values.

Traditional archery training offers a multifaceted approach to enhancing physical fitness, mental focus, and cultural engagement. The evidence suggests that while traditional archery can improve physical attributes such as coordination and strength, it fosters discipline and community within an Islamic framework. Therefore, future research could further explore the long-term benefits of traditional archery training and its role in promoting a healthy lifestyle among diverse populations.

3. Method

This section describes the essential procedures for developing the Systematic Literature Review (SLR), which aligns with the specified Research Questions (RQs) and objectives. A review study specifies a methodical framework for performing a comprehensive examination in a structured, clear, and reproducible way (Higgins et al., 2011). This review study analysis conforms with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), which was introduced by Page et al. (2021). Authors are guided by PRISMA in creating a systematic and thorough this review study while ensuring the quality of the selected articles. Guided by PRISMA, this review study is structured around four main principal steps: defining the research questions, employing systematic search strategies, evaluating article quality, and extracting and analyzing data.

3.1 Defining the Research Question

The first step in this review study involves formulating the research questions. Defining the research questions is the primary task during the planning phase and represents the essential component of any review study, as it influences and guides the entire review approach (Kitchenham & Charters, 2007). In this review study, research questions play a vital role as they establish the foundation and guide the whole review process. They define the scope and focus of the review study, facilitating the criteria for inclusion or exclusion of the studies and ensuring that the review remains relevant and closely aligned with the topic under investigation. For this, the author has utilized the PICO mnemonic. Note that employing the PICO framework aids in structuring research questions clearly and systematically by deconstructing the study's key elements into its three components. Correspondingly, this method ensures that the research remains focused and the questions are precisely formulated, facilitating the search for relevant literature or the design of a study. Developed by Lockwood et al. (2015), the PICO mnemonic stands for Population (P), Interest (I), and Context (Co). In this review study, corresponds to archers practicing traditional archery, I correspond to traditional archery, and Co corresponds to training. Following this PICO framework, the RQ formulated for this study is as follows:

- 1) What traditional archery training methods are documented in the literature?
- 2) How do these practices influence the physical, psychological, and performance outcomes of archers?

3.3 Systematic search strategies

The next step required for this review study is systematic search strategies. It comprises three

primary processes: identification, screening, and eligibility. Using these techniques, the authors could thoroughly identify and synthesize the research, leading to a well-organized and clear review study.

3.3.1 Identification

Identification involves identifying appropriate keywords for the search of relevant articles. The author selected three relevant keywords based on the established RQs: archery, traditional, and training. Following this, the author sought synonyms, comparable terms, and variations of the selected keywords to increase the likelihood of obtaining more articles for review. This effort was translated through searches in online thesaurus, reviews of databases, references to keywords from previous studies, and expert opinions. These keyword combinations were utilized with search functions, including field codes, phrase searching, Boolean operators, truncation, and wildcards, across two databases: Scopus and Web of Science (WoS).

Consequently, Scopus and WoS were selected as the primary databases due to their numerous advantages, such as advanced search capabilities, extensive coverage across multidisciplinary fields, and a broader, more comprehensive range of content (Gusenbauer & Haddaway, 2020). All relevant terms were identified, leading to the creation of search strings specifically for Scopus and WoS databases (see Table 1). This preliminary phase of the systematic review resulted in the retrieval of 261 publications from the two databases, all relevant to the study topic.

Table 1. The Search Strings

Scopus	(TITLE-ABS-KEY("Archery") AND TITLE-ABS-KEY("Traditional" OR "Classic" OR "Classical" OR "Common" OR "Conventional" OR "Historic" OR "Long-established" OR "Old" OR "Popular" OR "Regular" OR "Time-honored" OR "Universal")) AND ALL("training" OR "coaching" OR "discipline" OR "drill" OR "education" OR "exercise" OR "guidance" OR "instruction" OR "practice" OR "schooling" OR "teaching" OR "workout")) AND PUBYEAR > 2019 AND PUBYEAR < 2025 AND (LIMIT- TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (SRCTYPE, "j")) AND (LIMIT-TO (PUBSTAGE, "final")) Date of Access: November 2024
Web of Science (WoS)	((TS=(Archery) AND TS=("Traditional" OR "Classic" OR "Classical" OR "Common" OR "Conventional" OR "Historic" OR "Long-established" OR "Old" OR "Popular" OR "Regular" OR "Time-honored" OR "Universal")) AND TS=("training" OR "coaching" OR "discipline" OR "drill" OR "education" OR "exercise" OR "guidance" OR "instruction" OR "practice" OR "schooling" OR "teaching" OR "workout"))) AND (PY=("2020" OR "2021" OR "2022" OR "2023" OR "2024") AND DT=("ARTICLE") AND LA=("ENGLISH")) Date of Access: November 2024

3.3.2 Screening

The next phase in systematic search strategies is the screening step, wherein the author developed several inclusion criteria. This screening process evaluates potentially relevant research items to ensure they match the predefined RQ. It involves in selecting studies that concentrate on the traditional archery training. In addition, further reviews were made using distinct inclusion and exclusion criteria (see Table 2).

Table 2. The selection criterion

Criterion	Inclusion	Exclusion
Year	2020-2024	< 2019
Document Type	Article	Conference Paper, Proceeding Paper, Conference Review, Review Article, Review, Book Chapter, Book, Book Review, Early Access
Language	English	Non-English
Source Type	Journal	Conference proceeding, Book, Book series
Publication Stage	Final	In Press

These criteria included the publication year (articles published from 2020 to 2024), the document type (articles only), the language (restricting to English only), the source type (articles from journal only), and the publication stage (articles in final stage only). Consequently, 207 publications were excluded from the screening procedure, resulting in 54 papers to be examined for duplications. Upon inspection, 11 papers were discarded, resulting in 43 publications progressing to the eligibility step.

3.3.3 Eligibility

This is the third procedure referred to as eligibility. In this process, the author carefully re-evaluates all the 43 articles selected in the screening process. The articles need to be examined, and all the inclusion criteria must be met and consistent with the research objectives. Based on this process, 11 articles were excluded due to having titles that were not sufficiently relevant, being outside the field, and abstracts that did not align with the study's (Table 3). As a result, a total of 32 articles were finalized for the next stage, which is the quality assessment (see Figure 1).

Table 3. The research article findings excluded with justification.

No	Author & Year	Journal (Title, Volume, Issue, Page Number)	Title	Scopus	WOS	Justification
1	Jaelani et al. (2020)	Geojournal of Tourism and Geosites, Vol. 28, Issue 1, pp. 246-256	The religious meaning of equestrian and archery sport tourism: A phenomenological analysis	/	-	Focuses on the religious and tourism aspects of archery instead of traditional archery

						practices or training methods relevant to the SLR topic.
2	Yu et al. (2024)	Revista de Psicología del Deporte, Vol. 33, Issue 1, pp. 243-257	Research Progress on Chinese Traditional Archery: A Visualization Analysis Based on CiteSpace	/	-	Bibliometric Paper
3	Ramalingam et al. (2021)	Journal of Experimental Biology and Agricultural Sciences, Vol. 9 (Special issue 1), pp. S62-S70	A narrative review on mindfulness practices in optimizing performance among sports individuals	/	-	Review Paper
4	Ngadiman et al. (2024)	Retos, Vol. 59, pp. 923-927	Potential sports information system design; [Diseño potencial del sistema de información deportiva]	/	-	Focuses on sports information systems in general, with no specific relevance to traditional archery training methods in the SLR topic.
5	Ayeni et al. (2022)	Pilot and Feasibility Studies, Vol. 8, Issue 1, art. no. 201	Prospective evaluation of sports activity and the development of femoroacetabular impingement in the adolescent hip (PREVIEW): results of the pilot study	/	-	While archery is mentioned, the study focuses on hip impingement in various sports, not specific to traditional archery training methods relevant to the SLR.
6	Chen et al. (2023)	Parkinson's Disease, art. no. 9175129	The Rehabilitative Effect of Archery Exercise Intervention in Patients with Parkinson's Disease	/	/	Focuses on the therapeutic effects of archery for Parkinson's patients, not on traditional archery training methods relevant to the SLR topic.
7	Dundes (2020)	Humanities (Switzerland), Vol. 9, Issue 3, Article No.	The Upshot on Princess Merida in Disney/Pixar's Brave:	/	-	Focuses on gender roles and symbolism in a

	83		Why the Tomboy Trajectory Is Off-Target			Disney film. It does not provide information on traditional archery training methods relevant to the SLR topic.
8	Brown (2022)	Review of English Studies, Vol. 73, Issue 308, pp. 42–58	A Chivalric Show of Civic Virtue: The Society of Prince Arthur's Archers	/	-	Focuses on historical and literary analysis of an archery fraternity's role in civic pageantry. It does not provide information on traditional archer training methods.
9	Kuan et al. (2024)	Malaysian Journal of Medical Sciences, Vol. 31, Issue 3, pp. 241–251	Psychometric Properties of the Malay Version of the Coach-Athlete Relationship Questionnaire for Coaches and Athletes	/	-	Focuses on validating a questionnaire. It does not provide information on traditional archery training methods relevant to the SLR topic.
10	Snobl et al. (2024)	Journal of Wildlife Management, Vol. 88, Issue 1, Article No. e22507	Autumn resource selection by female elk in a recently burned landscape in western Montana	/	-	Focuses on wildlife management and elk behavior. It does not provide information on traditional archery training methods relevant to the SLR topic.
11	Jamtsho and Pradhan (2024)	SAGE Open Medical Case Reports, Vol. 12, Article No. 2050313X241271809	Arrowhead Chronicles: A case series on arrow injuries in the head and neck region of Bhutanese archers	/	/	Focuses on medical cases of arrow injuries. It does not provide information on traditional archery training methods relevant to the SLR topic.

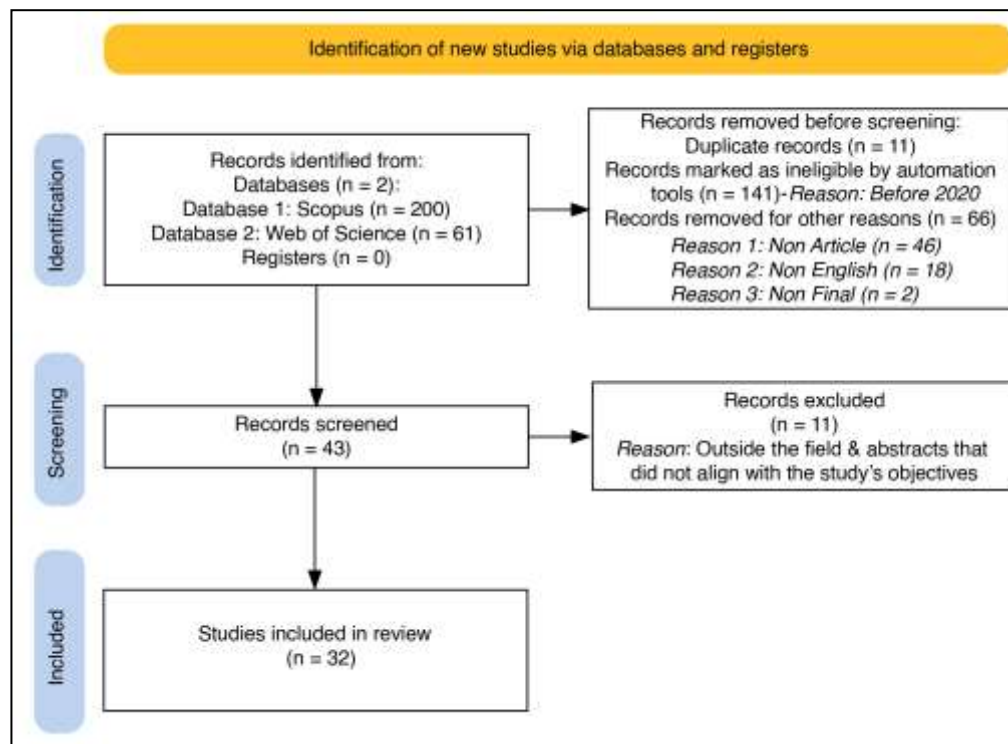


Figure 1. PRISMA 2020 flow diagram (Haddaway et al., 2022)

3.3.4 Quality Assessment of Articles

The quality assessment of articles was conducted to ensure that the method and evaluation of the articles selected were done appropriately. This selection process was performed according to the criteria established by Abouzahra et al. (2020). The criteria outlined by Abouzahra et al. (2020) consist of six key criteria for determining the quality of the articles. For each of the questions, three response options were provided: Yes (Y - 1 mark), Partly (P - 0.5 marks), and No (N - no marks). Only articles scoring marks of 3.0 or higher were accepted in the SLR. The questions are as follows below:

QA1. Is the purpose of the study clearly stated?

QA2. Is the relevance and usefulness of the work clearly presented?

QA3. Is the study methodology clearly defined?

QA4. Are the concepts of the approach well-articulated?

QA5. Is the work compared and evaluated against similar studies?

QA6. Are the limitations of the work clearly mentioned?

This assessment required the authors to evaluate the articles based on the questions. All authors performed the quality assessment separately, first by reviewing all selected publications and subsequently discussing their quality. From this process, the authors decided

that a total of 32 articles met the minimum required score and were advanced to the data extraction and analysis stage (Table 4).

Table 4. Quality assessment result

ID	QA1	QA2	QA3	QA4	QA5	QA6	Total Score	% By Max PS
PS1	Y	Y	Y	P	Y	Y	5.5	91.67
PS2	Y	Y	Y	Y	P	P	5	83.33
PS3	Y	Y	Y	Y	Y	P	5.5	91.67
PS4	Y	Y	Y	Y	Y	P	5.5	91.67
PS5	Y	Y	Y	Y	Y	P	5.5	91.67
PS6	Y	Y	P	Y	Y	P	5	83.33
PS7	Y	Y	Y	Y	P	N	4.5	75
PS8	Y	Y	Y	Y	Y	P	5.5	91.67
PS9	Y	Y	Y	Y	P	P	5	83.33
PS10	Y	Y	Y	P	Y	P	5	83.33
PS11	Y	Y	P	P	Y	N	4	66.67
PS12	Y	Y	Y	Y	Y	P	5.5	91.67
PS13	Y	Y	P	Y	P	N	4	66.67
PS14	Y	Y	P	Y	P	Y	5	83.33
PS15	Y	Y	Y	Y	Y	P	5.5	91.67
PS16	Y	Y	Y	Y	Y	P	5.5	91.67
PS17	Y	Y	Y	Y	Y	P	5.5	91.67
PS18	Y	Y	Y	Y	P	P	5	83.33
PS19	Y	Y	Y	P	P	Y	5	83.33
PS20	Y	P	Y	Y	P	N	4	66.67
PS21	Y	Y	Y	Y	P	Y	5.5	91.67
PS22	Y	Y	Y	Y	P	Y	5.5	91.67
PS23	Y	Y	Y	Y	Y	Y	6	100
PS24	Y	Y	Y	Y	Y	Y	6	100
PS25	Y	Y	P	Y	Y	N	4.5	75
PS26	Y	Y	Y	Y	P	N	4.5	75
PS27	Y	Y	Y	Y	P	P	5	83.33
PS28	Y	Y	Y	Y	Y	Y	6	100
PS29	Y	P	Y	P	Y	Y	5	83.33
PS30	Y	Y	Y	Y	P	Y	5.5	91.67
PS31	Y	Y	P	Y	P	N	4	66.67
PS32	Y	Y	Y	P	Y	P	5	83.33

Y: Yes (1 mark)

P: Partly (0.5 marks)

N: No (no marks)

3.3.5 Data Extraction and Analysis

This review examined data from quantitative, qualitative, and mixed-method studies. Reviews that integrate multiple research designs offer a wider range of viewpoints, opinions,

and solutions (Hong et al., 2018). In particular, finding crucial key topics and subtopics was the aim of this in-depth analysis. This integrative analysis was utilized as part of its assessment methodologies to examine and combine different research designs. Note that all the articles underwent thematic analysis due to the suitability and adaptability of thematic synthesis of data derived from various study designs (Flemming et al., 2019).

At this stage, the authors carefully analyzed all 32 publications, focusing on the result and discussion section by extracting assertions or content relevant to the research questions. Once the extraction data was completed, the authors and the co-authors collaborated to develop the themes based on the similarities and correlations among the previously discovered data. If there were any conceptual differences, the authors discussed to achieve mutual consent. The next step would be to validate the themes with experts in traditional archery and training. In the expert review phase, each theme was assessed to determine the domain validity. Changes have been executed at the author's discretion, following the expert's advice and input. Based on this process, the author managed to produce three major themes that relate to the identified research questions.

4. Results and Findings

From the 32 articles selected using the search technique above, the author developed three major themes through the thematic analysis method. The three main themes that the articles were categorized under are Historical and Cultural Aspects of Traditional Archery (8 articles), Training Methods and Technological Innovations in Archery (9 articles), and Psychological and Physiological Factors Affecting Archery Performance (15 articles). The articles that were highlighted to address multiple themes were coded accordingly. Table 5 provides an overview of the summarized themes.

Table 5. Research article findings based on the proposed search criterion

No.	Author & Year	Journal (Title, Volume, Issue, Page Number)	Title	Scopus	WoS	Theme
PS1	Ellis et al. (2023)	Journal of Park and Recreation Administration, Vol. 41, Issue 2, pp. 50-67	Evaluating Participant Experience Journeys: Peak-End Moments, Global Summaries, Dispersion, and Pattern	/	-	PPF
PS2	Arisman et al. (2024)	International Journal of Human Movement and Sports Sciences, Vol. 12, Issue 1, pp. 113-119	The Success of Archery Training in the New Normal Era	/	-	TMTI
PS3	Lytvynenko and Mulyk (2023)	Slobozhanskyi Herald of Science and Sport, Vol.	Analysis of the process of emergence and development trends of Ukrainian and	/	-	HCA

No.	Author & Year	Journal (Title, Volume, Issue, Page Number)	Title	Scopus	WoS	Theme
		27, Issue 4, pp. 168-174	Eastern National types of martial arts			
PS4	Tokmakci et al. (2023)	Human Movement, Vol. 24, Issue 4, pp. 80-89	Anxiety sensitivity, stress, and postural control: their implications on archery performance in 11–14-year-olds	/	-	PPF
PS5	Beyaz et al. (2024)	Journal of Motor Behavior, Vol. 56, Issue 1, pp. 78-90	Effects of Short-Term Novice Archery Training on Reaching Movement Performance and Interlimb Asymmetries	/	/	TMTI
PS6	Altayeva (2024)	Retos, Vol. 60, pp. 755-763	Exploring the impact of impulsive urban sounds and noise on open sports training through real-time AI sound analysis;	/	/	PPF
PS7	Mat Salleh et al. (2023)	Annals of Applied Sport Science, Vol. 11, Issue 4, Article e1285	Comparative Characteristics of Psychophysiological and Shooting Performance Between Intermediate and Elite Compound Archers	/	-	PPF
PS8	Kayacan et al. (2021)	Journal of Sports Medicine and Physical Fitness, Vol. 62, Issue 1, pp. 139-148	The hypothalamic-pituitary-adrenal axis activity in archers: Cortisol release, stress, anxiety and success	/	-	PPF
PS9	Komarudin et al. (2021)	International Journal of Human Movement and Sports Sciences, Vol. 9, Issue 4, pp. 66-70	Neurotracker training to improve shooting performance of archery athletes	/	-	TMTI
PS10	Tihanyi et al. (Tihanyi et al., 2020)	International Journal of Osteoarchaeology, Vol. 30, Issue 6, pp. 798-810	Brothers in arms: Activity-related skeletal changes observed on the humerus of individuals buried with and without weapons from the 10th-century CE Carpathian Basin	/	/	HCA
PS11	Feng (2023)	Revista Brasileira	Concentration improvement	/	/	PPF

No.	Author & Year	Journal (Title, Volume, Issue, Page Number)	Title	Scopus	WoS	Theme
		de Medicina do Esporte, Vol. 29, Article e2022_0382	test for athletes in archery training;			
PS12	Zanevskyy et al. (2021)	International Journal of Human Movement and Sports Sciences, Vol. 9, Issue 3, pp. 543–553	Reliability of testing of the electrical activity of muscles during isometric contractions in archery	/	-	PPF
PS13	Małolepszy and Drozdek-Małolepsza (2022)	Central European Journal of Sport Sciences and Medicine, Vol. 37, Issue 1, pp. 5–11	The Outline of the History of Physical Culture in the Province of Ternopil in the Years 1920-1939	/	-	HCA
PS14	Konda et al. (2023)	Orthopedic Reviews, Vol. 15	Archery-Related Musculoskeletal Injuries: An Epidemiological Study Revealing Injury Sites, Risk Factors, and Implications for Prevention	/	/	PPF
PS15	Sobko et al. (2022)	Journal of Physical Education and Sport, Vol. 22, Issue 10, pp. 2539–2548	Features of sports training of archers based on the use of simulators	/		TMTI
PS16	Chen (2024)	Applied Mathematics and Nonlinear Sciences, Vol. 9, Issue 1, art. no. 20243288	Research on the Diffusion and Evolution of Ethnic Traditional Sports Culture Based on Spatial Diffusion Modeling	/	-	HCA
PS17	Prior and Coates (2020)	Qualitative Research in Sport, Exercise, and Health, Vol. 12, Issue 2, pp. 224–241	Archers' experiences of target panic: an interpretative phenomenological analysis	/	-	PPF
PS18	Azadjou et al.	Entropy, Vol. 25,	Dynamical Analyses Show	/	-	PPF

No.	Author & Year	Journal (Title, Volume, Issue, Page Number)	Title	Scopus	WoS	Theme
	(2023)	Issue 10, art. no. 1414	That Professional Archers Exhibit Tighter, Finer, and More Fluid Dynamical Control Than Neophytes			
PS19	Mariani and Matsuo (2020)	Meccanica, Vol. 55, Issue 9, pp. 1733–1752	The static deformation of the asymmetric Japanese bow: modeling bow asymmetries with the Elastica theory	/	-	TMTI
PS20	Chen et al. (2024)	Cogent Arts and Humanities, Vol. 11, Issue 1, art. no. 2335759	On the modern horseback archery and the awakening of Chinese national consciousness (1921 – 1949)	/	-	HCA
PS21	Lease et al. (2024)	Journal of Information Science and Engineering, Vol. 40, Issue 5, pp. 1017–1029	Online Biomechanical Evaluation System for Archery	/	-	TMTI
PS22	Tsai et al. (2021)	Medicine (United States), Vol. 100, Issue 8, pp. e24753	Immediate effect of non-invasive auricular acupoint stimulation on the performance and meridian activities of archery athletes: A protocol for randomized controlled trial	/	/	PPF
PS23	Ogasawara et al. (2023)	Sports Engineering, Vol. 26, Issue 1, art. no. 9	Automatic shooting detection in archery from acceleration data for score prediction	/	/	TMTI
PS24	Steffen et al. (2020)	British Journal of Sports Medicine, Vol. 54, Issue 3, pp. 168–175	How do the new Olympic sports compare with the traditional Olympic sports? Injury and illness at the 2018 Youth Olympic Summer Games in Buenos Aires, Argentina	/	-	PPF
PS25	Lewis (2023)	Journal of Hellenic Studies, Vol. 143, pp. 24–48	The Cretan way of war: status, violence, and values from the Classical period to the Roman conquest	/	-	HCA

No.	Author & Year	Journal (Title, Volume, Issue, Page Number)	Title	Scopus	WoS	Theme
PS26	Zhang (2024)	Applied Mathematics and Nonlinear Sciences, Vol. 9, Issue 1, Article No. 202301644	Muscle Strength Enhancement and Metabolic Acceleration of College Students in Traditional Archery Programs Based on Functional Training	/	-	TMTI
PS27	Wali et al. (2022)	International Journal of Human Movement and Sports Sciences, Vol. 10, Issue 5, pp. 1004–1010	Deer Hunting Tradition of the Kuligang Community to Identify the Types of Sports Branches (Ethnographic Study)	/	-	HCA
PS28	Tan and Low (2022)	Human Movement, Vol. 24, Issue 2, pp. 70–77	Microstructure of practice activities for team and individual sports	/	/	TMTI
PS29	Alberola-Zorrilla et al. (2024)	Physiotherapy Theory and Practice, Vol. 40, Issue 6, pp. 1343–1350	Where do archers hurt? Epidemiology of injuries during archery practice	/	/	PPF
PS30	Sirufo et al. (2020)	International Journal of Environmental Research and Public Health, Vol. 17, Issue 12, Article No. 4218	Microvascular damage in a young female archer assessed by nail fold videocapillaroscopy: A case report	/		PPF
PS31	Ashraf (2025)	Journal of Asian and African Studies, Early Access (April 2024), pp. 1–12	Education and Training of Archery in Mughal India		/	HCA
PS32	Ondokuz (2020)	Ambient Science, Vol 7, (Special Issue), pp. 198–202	Effect of Menstrual Cycle on Sport Performance in Archers		/	PPF

Note. HCA = Historical and Cultural Aspects of Traditional Archery; TMTI = Training Methods and Technological Innovations in Archery; PPF = Psychological and Physiological Factors Affecting Archery Performance.

4.1 Historical and Cultural Aspects of Traditional Archery (HCA)

Traditional archery has been a pivotal aspect of martial, cultural, and communal practices across centuries. This review provides an expanded synthesis of findings from all eight articles, focusing on the Historical and Cultural Aspects of Traditional Archery. Furthermore, archery's foundational role in early societies highlights its importance as a survival and military tool. Lytvynenko and Mulyk (2023) revealed that in Ukraine, the martial culture tied to archery began in the Trypillian era (5400–2750 BCE). By the Kyivan Rus period (9th–13th centuries), archery was central to youth training, blending weapon mastery with physical fitness. The Zaporizhzhya Sich Cossacks institutionalized this tradition, emphasizing systematic archery preparation as part of their warrior ethos. This study also noted parallels with Japanese samurai traditions, suggesting global similarities in archery's martial development. Ashraf (2025) provided a complementary perspective from Mughal India, where archery training encompassed physical drills, strategic skill-building, and courtly recreation. The structured pedagogy emphasized precision and discipline, aligning with the era's broader intellectual and martial sophistication focus. This dual role of archery—a means of defense and a reflection of elite culture—underscored its versatility and significance in Mughal society.

Archery frequently symbolized national identity and resilience. Chen et al. (2024) examined the resurgence of horseback archery in China from 1921 to 1949, a period marked by national crises. The integration of traditional Chinese techniques with Western influences in modern horseback archery demonstrated how archery evolved as a cultural bridge. Remarkably, this resurgence was tied to fostering national consciousness, reinforcing archery as a medium for cultural preservation and unity in the face of adversity. In Crete, Lewis (2023) explored how archery symbolized agility and independence within a unique martial ethos. Unlike the phalanx formations of mainland Greece, Cretan tactics emphasized ambushes, open-order combat, and strategic mobility. These methods reflected Crete's rugged terrain and socio-political organization, offering a stark contrast to contemporary Greek warfare. Accordingly, archery became not just a martial practice but a symbol of cultural divergence and innovation.

Archery's integration into community traditions underscores its role in maintaining cultural continuity. On the other hand, Wali et al. (2022) studied the deer-hunting traditions of Indonesia's Kuligang community, revealing how archery preserved ancestral practices. This tradition combined practical hunting with ritualistic elements, strengthening community bonds and linking modern-day practices with historical roots. The ethnographic study emphasized the significance of archery in sustaining cultural heritage. In Poland's Ternopil Province during the interwar years, Małolepszy and Drozdek-Małolepsza (2022) identified archery as a unifying activity among Polish, Ukrainian, and Jewish communities. At the same time, competitions and clubs provided avenues for physical activity while fostering social cohesion during a geopolitically tense period. Hence, archery became a medium for bridging ethnic divides through shared physical culture.

Archaeological findings offer concrete evidence of archery's impact on past societies. Tihanyi

et al. (2020) analyzed skeletal remains from 10th-century Hungary, focusing on humeral adaptations linked to repetitive archery use. These findings illustrated how archery shaped physical characteristics, particularly in warriors, and reinforced its role in defining social and martial identities. Moreover, the study highlighted the connection between repetitive archery practice and skeletal markers, providing insights into the lives of ancient archers. Archery's spread across regions showcases its adaptability to changing social and cultural contexts. Alternatively, Chen (2024) used spatial diffusion models to examine how traditional sports, including archery, were disseminated across China. The study revealed that urbanization and migration facilitated the sport's adaptation while retaining its cultural essence. The balance between preserving tradition and embracing modernity underscores archery's resilience as a cultural practice.

Across diverse societies, archery has served as more than just a martial skill—it has been a vital element of cultural identity, societal cohesion, and symbolic expression. From the military rigor of Kyivan Rus and Mughal India to the symbolic revival of horseback archery in modern China, traditional archery reflects human adaptability and cultural preservation. In community contexts, such as the Kuligang's hunting traditions or interwar Ternopil's competitions, archery strengthened communal ties while sustaining historical practices. Finally, bioarchaeological evidence and diffusion studies illustrate archery's tangible and intangible impacts, marking it as a cornerstone of cultural evolution. This review comprehensively integrates the findings of all eight articles to provide a nuanced understanding of the Historical and Cultural Aspects of Traditional Archery.

4.2 Training Methods and Technological Innovations in Archery (TMTI)

Archery training has evolved significantly by adopting advanced methods and technologies to improve performance, precision, and accessibility. Arisman et al. (2024) investigated hybrid training strategies, blending virtual and in-person sessions during the COVID-19 pandemic. Their study demonstrated that athletes achieved notable improvements in their post-test scores compared to pre-test results, with an increase from 18.30 to 22.53 points. A key element of this success was self-video feedback, which enabled archers to analyze their techniques remotely and make corrections. This approach highlights how blended methods can address training disruptions and provide flexibility while maintaining performance outcomes.

Focusing on novice archers, Beyaz et al. (2024) assessed the impact of a 12-week traditional training program. The study reported enhanced motor accuracy and precision in both dominant and non-dominant arms. However, persistent interlimb asymmetries suggested that short-term interventions might be insufficient for achieving full motor symmetry. Hence, this finding underscores the need for longer-term or more targeted training regimens to address foundational biomechanical issues effectively. These results emphasize the importance of tailoring training durations and designs to the specific needs of novice athletes. Additionally, cognitive and psychological factors have increasingly been integrated into archery training. Komarudin et al. (2021) introduced NeuroTracker, a cognitive training tool designed to enhance focus and decision-making in archers. The experimental group presented superior

accuracy in competitive scenarios compared to traditional methods. By training athletes to maintain focus under pressure, NeuroTracker not only improved shooting performance but also addressed the psychological challenges of competition. This study emphasizes the value of incorporating cognitive and psychological development into archery coaching programs to prepare athletes for high-stress environments.

Simulation-based technologies have also emerged as powerful tools in archery training. Sobko et al. (2022) evaluated simulators such as “Posture Practice” and “Elbow Pad,” which were designed to enhance physical and technical readiness. Their findings revealed that athletes using these tools exhibited superior performance in tasks such as stretching the bow and shooting at 18 m and 60 m distances. Notably, by improving biomechanics and muscle memory, these simulators helped athletes achieve consistent and repeatable motion patterns, highlighting their effectiveness as supplementary training aids. The application of biomechanical insights has been instrumental in optimizing both training and equipment. Mariani and Matsuo (2020) focused on the unique deformation of asymmetric Japanese bows, utilizing elastica theory to analyze how grip position and limb asymmetry influence bow performance. Their research provided valuable recommendations for designing and reconstructing traditional bows and offered insights into how such designs affect targeting and energy efficiency. Similarly, Lease et al. (2024) developed a markerless biomechanical evaluation system powered by machine learning algorithms. This system allowed archers to receive immediate feedback on posture and movement, enabling real-time corrections during training. Such advancements demonstrate how biomechanical tools can enhance accessibility and precision in archery coaching.

Machine learning has further transformed archery training by facilitating data-driven performance analysis. Ogasawara et al. (2023) applied Random Forest algorithms to detect arrow releases and predict scores based on tremor patterns during aiming. This approach significantly improved accuracy compared to traditional detection methods, reducing the number of shots required for analysis while maintaining reliability. Thus, by associating postural stability with scoring outcomes, this study demonstrated the potential of machine learning in bridging technical analysis with practical applications.

In addition to technical and cognitive enhancements, physical conditioning remains a cornerstone of archery training. Zhang (2023) explored the effects of functional training on muscle strength and metabolic efficiency among college archery students. The results presented a 30% increase in muscle strength and a substantial rise in metabolic capacity, from 2.74 to 5.03 METs, highlighting the positive impact of tailored strength programs on athletic performance. These findings underscore the need for comprehensive conditioning protocols that align with the physical demands of archery. Lastly, Tan and Low (2023) investigated the microstructure of archery practice sessions, finding that archers spent 51– 83% of their time on drill-based training rather than competition-like activities. While this traditional approach aids skill refinement, the study suggested incorporating more match-like scenarios to better simulate competitive conditions. This balance is essential for preparing athletes to effectively adapt their refined skills to real-world challenges.

The reviewed studies collectively demonstrate the transformative impact of integrating modern technologies, cognitive tools, and physical conditioning into archery training. Blended learning methods, biomechanical evaluation systems, and machine learning algorithms have revolutionized traditional approaches, making training more precise, adaptable, and accessible. At the same time, simulation tools and functional training programs further enhance physical readiness and technique, while cognitive interventions address the psychological demands of competitive archery. Together, these innovations offer a holistic framework for archery training, emphasizing the interplay between technology, biomechanics, and human performance. Therefore, future directions may focus on combining these advancements into comprehensive training systems catering to athletes at all levels, ensuring individual development and broader accessibility.

4.3 Psychological and Physiological Factors Affecting Archery Performance (PPF)

Archery is a sport that requires a fine balance between psychological resilience and physiological readiness. The integration of these factors, along with injury management and external environmental considerations, plays a critical role in enhancing performance. This review provides an expanded synthesis of findings from 16 studies on how psychological and physiological aspects influence archery outcomes.

Maintaining focus is a cornerstone of archery, where precision and consistency depend on effectively managing cognitive and motor processes. Ellis et al. (2023) introduced the concept of “peak-end moments,” demonstrating how archers evaluate their performance based on high-stakes events, particularly during competitions. These moments influence athletes’ emotional responses and their ability to sustain focus in subsequent attempts. Furthermore, structured mental training to manage emotional responses during critical moments improved long-term performance perception and outcomes. Azadjou et al. (2023) and Feng (2023) highlighted the significance of motor and neuromuscular control in archery. Moreover, professional archers, according to Azadjou et al. (2023), exhibit tighter and more fluid motor execution, with superior neuromuscular coordination contributing to accuracy. This refined motor skill differentiates elite athletes from novices, making it a key area for targeted training. Meanwhile, Tsai et al. (2021) demonstrated that non-invasive auricular acupoint stimulation improves attention and reduces fatigue by influencing the autonomic nervous system. This novel intervention supports the link between mental stability and physiological regulation for sustained performance.

Stress is a significant psychological factor that undermines performance by disrupting automatic motor execution. Tokmakci et al. (2023) asserted that heightened anxiety sensitivity, particularly among adolescent archers, not only impairs postural control but also reduces shooting success. This finding aligns with Prior and Coates (2020), who explored “target panic,” a common phenomenon in archery caused by the athlete’s shift from unconscious motor execution to conscious control. This shift disrupts the athlete’s flow state, reducing accuracy and consistency. Additionally, Mat Salleh et al. (2023) demonstrated that elite archers exhibit significantly lower levels of somatic anxiety and higher self-confidence than their intermediate counterparts, leading to superior accuracy and precision in

competitive scenarios.

Physiological readiness plays a central role in archery performance, particularly under competitive stress. Kayacan et al. (2021) examined the Hypothalamic-Pituitary-Adrenal (HPA) axis, highlighting cortisol release as a critical factor influencing recovery and sustained performance. Effective regulation of this axis ensures that athletes can manage stress responses without compromising performance consistency. Note that Zanevskyy et al. (2021) focused on neuromuscular activity, emphasizing the importance of stable isometric contractions for maintaining shooting precision. In addition, variability in muscle activity was identified as a significant source of performance inconsistency, particularly in novice archers. This underscores the significance of strength and coordination training in enhancing physiological adaptability. Meanwhile, Tsai et al. (2021) linked meridian activities stimulated through acupoint techniques to enhance physiological and psychological stability, suggesting that holistic approaches can improve mental and physical readiness.

Archery performance is also influenced by environmental stressors such as noise and distractions. Altayeva (2024) demonstrated the negative impact of impulsive urban sounds on focus and cognitive stability in athletes. Athlete's training in noisy or unpredictable environments experienced greater cognitive overload, leading to reduced accuracy. Simultaneously, controlled training environments or noise adaptation strategies are thus essential to mitigate such external stressors and build resilience for competition. Gender-specific physiological differences, such as hormonal variations, significantly influence performance. Ondokuz (2020) examined the impact of the menstrual cycle on female archers, finding that hormonal fluctuations during certain phases impair coordination and physical capacity. These effects were not universal yet varied among individuals, highlighting the significance of personalized training regimens for female athletes. Additionally, Sirufo et al. (2020) documented microvascular damage caused by repetitive strain in female archers. The study emphasized the need for regular health monitoring and preventive measures, such as strength training and recovery protocols, to mitigate long-term complications.

Injury prevention is critical for maintaining longevity in archery. Konda et al. (2023) identified the shoulders, neck, and back as the most common injury sites in archery, primarily caused by overuse and poor technique. Hence, proper strength training, protective equipment such as finger tabs, forearm guards, and corrective exercises were recommended to reduce these risks. Alberola-Zorrilla et al. (2024) corroborated these findings, suggesting that repetitive strain injuries are prevalent among archers and often result in chronic issues if left untreated. Steffen et al. (2020) further noted that while archery has a lower acute injury rate than other sports, repetitive strain injuries to tendons, ligaments, and joints pose long-term challenges for athletes.

The comprehensive integration of findings from these 16 articles underscores the interconnected roles of psychological resilience, physiological readiness, and environmental adaptation in optimizing archery performance. That is, mental focus and emotional regulation are foundational for achieving precision, while mindfulness practices help mitigate stress and

anxiety. Furthermore, physiological preparedness, including neuromuscular stability and effective stress management through the HPA axis, ensures consistency during competition. In addition, gender-specific considerations and injury prevention strategies further support long-term athlete sustainability. Together, these insights provide a holistic framework for tailoring training and performance optimization strategies in archery.

5. Discussion

The review study of traditional archery training has revealed a multifaceted discipline that intertwines historical practices, modern innovations, and complex performance factors. By examining 32 articles across three primary themes: Historical and Cultural Aspects, Training Methods and Technological Innovations, and Psychological and Physiological Factors Affecting Performance, we gain a comprehensive understanding of how traditional archery has evolved and how it continues to impact athletes today.

5.1 *Historical and Cultural Aspects of Traditional Archery (HCA)*

The historical analysis underscores traditional archery's deep roots in various cultures as a martial art symbol of societal values. Studies from Lytvynenko and Mulyk (2023) and Ashraf (2025) highlighted how archery was integral to military training and cultural identity in regions like Ukraine and Mughal India. The institutionalization of archery practices, such as the systematic preparation by the Zaporizhzhya Sich Cossacks and the structured pedagogy in Mughal courts, illustrates its significance beyond mere sport.

The resurgence of traditional archery practices, as observed by Chen et al. (2024) in China, reflects a broader movement to reclaim cultural heritage amidst modernization. This revival serves as a means of preserving historical techniques and as a catalyst for fostering national consciousness and unity. Similarly, Lewis (2023) demonstrated how Cretan archery tactics, diverging from mainland Greek warfare, symbolized cultural identity and strategic innovation.

The ethnographic studies by Wali et al. (2022) and Małolepszy and Drozdek-Małolepsza (2022) emphasized archery's role in community cohesion and preserving ancestral traditions. These practices reinforce communal bonds and provide continuity between past and present. Moreover, the bioarchaeological evidence presented by Tihanyi et al. (2020) offers tangible insights into the physical impact of archery on individuals, further solidifying its importance in historical societies.

Collectively, these findings highlight that traditional archery is more than a historical artifact. It is a living tradition that continues to shape and reflect cultural identities. The enduring relevance of traditional archery practices underscores the necessity of preserving these cultural heritages while adapting them to contemporary contexts.

5.2 *Training Methods and Technological Innovations in Archery (TMTI)*

The integration of modern technology into traditional archery training represents a significant advancement in the sport. Arisman et al. (2024) demonstrated the efficacy of blended training methods, combining virtual and in-person sessions to overcome challenges such as those

posed by the COVID-19 pandemic. Notably, using self-video feedback allows for continued skill development and technique refinement, illustrating the adaptability of training methods to changing circumstances.

The enhancement of cognitive and psychological skills through tools like NeuroTracker, as explored by Komarudin et al. (2021), signifies a shift towards a more holistic training approach. By improving focus and decision-making, archers are better equipped to manage competitive pressures. Similarly, using simulators and biomechanical analysis tools (Lease et al., 2024; Sobko et al., 2022) allows for precise technical adjustments, leading to improved performance and injury prevention. Additionally, machine learning applications, such as those developed by Ogasawara et al. (2023), offer data-driven insights into performance metrics, enabling personalized training programs. Accordingly, these technological innovations bridge the gap between traditional techniques and modern scientific approaches, enhancing the effectiveness of training while respecting the foundational principles of the discipline.

However, the persistence of interlimb asymmetries noted by Beyaz et al. (2024) suggests that while technological and methodological advancements are beneficial, they may not fully address all training challenges, particularly in short-term programs. This highlights the need for sustained and targeted training interventions to achieve comprehensive skill development.

5.3 Psychological and Physiological Factors Affecting Archery Performance (PPF)

The psychological demands of archery are profound, with stress, anxiety, and concentration playing critical roles in performance. Studies by Tokmakci et al. (2023) and Prior and Coates (2020) revealed that heightened anxiety sensitivity and phenomena like target panic can significantly impair performance, especially among younger athletes. These findings emphasize the significance of mental training and stress management techniques in archery training programs.

Physiological factors, including neuromuscular control and hormonal responses, are equally crucial. Research by Azadjou et al. (2023) indicated that elite archers exhibit superior neuromuscular coordination, contributing to their success. Meanwhile, the work of Kayacan et al. (2021) on cortisol release highlighted the interplay between physiological stress responses and performance, suggesting that effective regulation of the HPA axis is essential for optimal performance.

Gender-specific factors, such as the impact of the menstrual cycle on performance (Ondokuz, 2020), underline the necessity for personalized training approaches that account for individual physiological differences. Additionally, the prevalence of overuse injuries and the importance of injury prevention strategies, as discussed by Konda et al. (2023) and Alberola-Zorrilla et al. (2024), highlight the need for comprehensive training that includes physical conditioning and proper technique.

Environmental factors, including urban noise, as examined by Altayeva (2024), also affect psychological focus and performance. This suggests training programs should incorporate strategies to mitigate or adapt to such external stressors.

6. Conclusion

This review study reveals that traditional archery training is a complex interplay of historical practices, modern innovations, and multifaceted performance factors. The preservation of cultural heritage remains a foundational aspect, with traditional practices providing valuable insights into effective training methods and community engagement. Moreover, integrating technology and innovative training approaches enhances skill development, offering new avenues for performance optimization while respecting the sport's rich traditions.

Psychological and physiological factors are critical determinants of success in archery. Therefore, effective training programs must address mental resilience, stress management, and physical conditioning to prepare athletes comprehensively. Moreover, personalized approaches considering individual differences, including gender-specific physiological factors, are essential for maximizing performance and athlete well-being.

The synthesis of historical wisdom with contemporary scientific advancements presents a holistic framework for traditional archery training. Therefore, future research should focus on developing standardized training protocols that integrate cultural traditions with modern techniques, ensuring the sport's sustainability and continued relevance. Notably, by embracing the heritage and innovation inherent in traditional archery, practitioners, and coaches can enhance performance outcomes and contribute to preserving and evolving this timeless discipline.

7. Implications for Practice and Future Research

The implications for practice and future research in traditional archery emphasize several key areas for development. Notably, incorporating historical and cultural education into training programs can enrich athletes' understanding of the sport's heritage, fostering a deeper appreciation for its historical and cultural significance. In addition, technological integration also holds promise, with advanced tools like biomechanical analysis and machine learning offering personalized feedback to optimize training efficiency. Moreover, a holistic approach to training is equally critical, focusing on psychological resilience, stress management, and physical conditioning to address the interconnected nature of these factors in enhancing performance. Additionally, designing personalized and inclusive training programs that consider individual physiological differences and environmental factors can promote adaptability and inclusivity within the sport. Finally, collaboration between historians, coaches, sports scientists, and technologists is essential to developing standardized training protocols that honor traditional practices while embracing modern innovations. Accordingly, by adopting these strategies, the traditional archery community can ensure the sport's vitality and relevance in the modern era, fostering a new generation of skilled and culturally aware archers.

From a theoretical perspective, future research should work toward developing more coherent and culturally grounded frameworks that integrate traditional knowledge with contemporary sport science, thereby addressing the current fragmentation in conceptual foundations. From a practical standpoint, greater methodological consistency particularly in measurement tools,

implementation details, and training protocols is needed to strengthen the comparability of findings and facilitate evidence-based practice. Collectively, addressing these theoretical and practical limitations will deepen scholarly understanding and enhance the translation of research into effective and culturally sensitive training interventions.

AI Usage Disclosure Statement

This manuscript involved the use of an AI language model (ChatGPT) solely for language refinement and editorial assistance. The AI tool was not used to generate, analyze, or interpret any scholarly content, nor did it contribute to the development of the study's conceptual, methodological, or analytical components. All intellectual contributions, including the research design, data analysis, interpretation, and conclusions, were fully developed by the authors.

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