

Research Progress on Chinese Traditional Archery: A Visualization Analysis Based on CiteSpace

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Abstract

With the intensification of global interactions, domestic scholars have progressively recognized the imperative to rejuvenate traditional Chinese archery, embarking on dedicated research endeavours. However, the multifaceted nature of archery, encompassing elements of sport, skill, and weaponry, introduces considerable uncertainties regarding its prospective developmental trajectories. Bibliometric analysis has emerged as a novel methodological approach and scholarly focal point for addressing these uncertainties. This study sought to employ a quantitative methodology to assess the corpus of Chinese traditional archery literature, employing CiteSpace for bibliometric analysis to construct a systematic knowledge map of Chinese traditional archery research. Through a comprehensive review of pertinent literature in the realm of traditional Chinese archery, the aim was to discern the future trajectory of research in this domain, with a view to safeguarding and perpetuating traditional archery within contemporary society while preserving China's cultural heritage. The findings revealed a pivotal emphasis on investigating the educational value of traditional archery in China. Furthermore, discernible research trends indicated a growing interest in elucidating the positive effects of traditional archery on physical health and mental well-being. Additionally, research forefronts included the preservation and advancement of traditional archery skills, the application of cutting-edge technology to augment athletes' competitive prowess, and the integration of traditional archery into interdisciplinary university curricula. Subsequent research endeavours should prioritize delving into the educational significance of traditional archery and harnessing advanced technology to enhance athletes' competitive capabilities.

Keywords: Chinese Traditional Archery; Bibliometrics; Knowledge System; Research Hotspots; CNK.

1. Introduction

Across the annals of human history, scarcely have there been inventions endowed with metaphorical richness comparable to the bow. From the inception of human civilization, the bow has functioned not solely as a hunting instrument and a tool of warfare, but also as a proficient pedagogical implement and a modality for spiritual development during periods of tranquillity (Kim, Kang, & Kwon, 2022). Archery, characterized by an extensive legacy of transmission and broad participation, manifests its influence not solely within military contexts but also extends to spheres encompassing education, everyday life, and various other domains (Zhang et al., 2023). Ancient China witnessed traditional archery as a deeply rooted cultural activity, influencing politics, economics, etiquette education, military practices, and more. Over time, the thematic focus of archery evolved, giving rise to the "she li" culture that emphasized the fusion of martial and literary arts, educational applications of archery, and the promotion of cultural harmony. Zhou Wu King's

leadership established archery in schools and the military, shaping it as a tool for identifying talent. In contemporary school education, archery not only enhances physical fitness but also fosters moral and etiquette development, bridging the realms of arts and sports. The distinctive nature of traditional Chinese archery, contrasting with modern Western sports, underscores their complementary educational significance and value (Zhang & Yao, 2018). The role attributed to traditional archery in China, namely "learning etiquette and cultivating virtues," dates back to the Pre-Qin period (Zhang, Yao, & Ji, 2017). The distinctive attributes of "virtue" and "etiquette" characterize traditional Chinese archery. For instance, in the shooting ritual, emphasis is placed on virtues, with the notion that "its competition is for gentlemen" (prioritizing virtue over rivalry) and "if one misses, he reflects on himself" (encouraging self-reflection post-competition). Across different epochs, varying ruling classes have assigned diverse political and ideological significances to archery. The association between archery and virtue dates back to the Western Zhou period, as evidenced by inscriptions on

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bronze wares recounting the Zhou king's use of archery rituals to assess Xing Bo's loyalty, leaving an impression of unwavering fidelity (Chen, 2020). Subsequently, in the "Art of Archery" chapter within the "Book of Rites," there is an explicit reference to the idea that "this is the way to observe great virtues" (indicating that archery can unveil an individual's character). Noteworthy works such as Wang Shouren's "Observations from the Turret of Virtue" further underscore this concept, enduring through the ages. The notion of "observing virtue through archery" constitutes a fundamental tenet in Chinese archery, wherein archery serves as a vehicle for the observation and cultivation of virtues within the framework of traditional Chinese culture. This practical and technical pursuit gradually assimilates into students' moral education, transforming moral education into a habitual behavioural practice. The paradigm of "observing virtue through archery" thus establishes a meaningful objective for students' moral development (Zhang, Mao, & An, 2013). This alignment resonates with contemporary societal values, infusing archery with novel connotations. Nevertheless, within the current landscape of Chinese school sports, Western sports exert predominant influence (Chen & Bi, 2013; Chen & Zhao, 2018). Educators often neglect the educational potential of traditional Chinese sports. A search for "traditional Chinese sports" on CNKI revealed that only 0.2% of school sports articles focus on them. Expanding the keyword to "ethnic traditional sports" yielded a meagre 2% of relevant research. This underscores the overlooked status of traditional Chinese sports. In the face of societal changes and the dominance of Western sports, the preservation and advancement of traditional Chinese archery culture are at risk. Therefore, a bibliometric analysis is essential to discern development trends and research directions in traditional Chinese archery, contributing to its preservation and evolution.

In the last decade, both the Chinese government and civil society organizations have prioritized the long-term challenge of preserving and advancing Chinese culture. Various measures have been implemented to facilitate the integration of exemplary traditional culture into the national education system, resulting in the accumulation of successful policies and practical experiences. In 2017, the State Council of China introduced the "Opinions on the Implementation of the Project of Inheriting and Developing Excellent Traditional Chinese Culture," emphasizing the systematic incorporation of traditional Chinese cultural education into the curriculum and textbook system. Subsequently, in 2020, the State Council reissued the "Opinions on Strengthening and Improving School Sports Work in the New Era," with a specific

emphasis on fostering the development of China's outstanding traditional sports culture. President Xi Jinping has underscored the importance of excavating and interpreting exemplary traditional Chinese culture, aligning it with contemporary values and harmonizing it with modern society. Consequently, the effective investigation of traditional Chinese sports initiatives has emerged as a prominent research focus, with traditional archery garnering significant attention from both domestic and international scholars and research institutions. For example, Gong (2018) contends that the intrinsic rationale behind the cultural transformation of traditional archery primarily resides in the amalgamation of internal and external cultivation. Lv et al. (2017) advocate that traditional archery ought to adhere to principles of integrity and active participation in its historical legacy, fostering harmonious coexistence with contemporary archery sports. Li and Xiang (2016) maintain that the fundamental premise for the reintroduction of traditional archery into academic institutions lies in the holistic development of both the physical and mental facets of the individual. Hahn (2022), A scholar of foreign origin conducted an inquiry into the educational significance of Korean archery, centring the investigation on the historical roots and evolution of this traditional discipline. Ki and Kim (2022) leveraging the theory of multiple intelligences, an exploration is undertaken to elucidate the educational value and significance inherent in target challenge archery sports activities. The discerned research accomplishments wield substantial influence in the preservation and advancement of traditional Chinese culture. The burgeoning impact of academic research on the trajectory of traditional Chinese archery within educational institutions underscores its perceived efficacy as a means to acquire comprehensive insights into the research domain (Zuo & Zhao, 2014). While the Web of Science (WOS) and Scopus databases serve as crucial repositories of global scholarly resources, their representation of Chinese traditional archery research remains comparatively limited for Chinese scholars in comparison to CNKI, which stands as China's largest database of scholarly literature.

Therefore, this study used the citation analysis tool Cite Space (Jie & Chen, 2016) as a bibliometric tool to conduct quantitative statistical analysis and qualitative description of the literature on Chinese traditional archery research in the past 20 years. Utilizing the CNKI database, a comparative analysis was performed on publication patterns, collaborative networks, knowledge foundations, and research focal points. The study sample comprised 190 Chinese-language research articles within the CNKI database, elucidating the present condition, evolutionary

trajectory, and prospective trajectories of Chinese archery research. The study delineates the knowledge framework within the Chinese archery domain from 2003 to 2023, offering a valuable point of reference for fellow scholars and contributing insights to the cultural preservation and development of Chinese archery.

The structural framework of this article is delineated as follows: commencing with the introduction, Section 2 furnishes a comprehensive literature review, succeeded by an elucidation of the research methodology. Subsequently, in Section 4, the research findings will be expounded upon. Section 5 engages in a discourse on the obtained research outcomes, and ultimately, the article culminates by presenting conclusions and delineating the limitations of the study.

2. Literature Review

The bow and arrow, a historical projectile weapon system found across diverse cultures, precedes recorded history. This section delves into the literature review, summarizing existing studies on traditional Chinese archery to highlight characteristics and gaps. Previous research primarily focuses on the inheritance and development of Chinese archery culture, progressing systematically across the perspectives of traditional culture inheritance, manufacturing technology of traditional archery, and the educational value of traditional archery.

The resurgence and evolution of Chinese archery culture have entailed deliberations on the perpetuation and advancement of the values inherent in Chinese archery culture. It is posited that the developmental trajectory of "harmonizing skills with Tao" facilitates the discernment of rational values within Chinese archery, thereby imparting a spiritual dimension to the cognitive transcendence of Chinese traditional sports, surpassing mere instrumental rationality (Zhang & Sun, 2021). The exploration of the pursuit of the "archery" value at the "Tao" level holds merit. Chinese traditional archery culture, abundant in resources and imbued with profound spiritual connotations, confronts a contemporary challenge stemming from the ambiguous core values within its revival context (Tang, 2020). Hence, there is a need to investigate both the value and the present circumstances surrounding the resurgence of Chinese archery culture.

The manufacturing technology employed in traditional archery serves as a reflection of the proficiency in Chinese manufacturing processes. Presently, Chinese traditional archery equipment predominantly relies on imitation, exhibiting a dearth of autonomous innovation (Li & Luan, 2016). A discernible disparity exists in terms of pricing,

models, and lifespan between Chinese traditional bows and their international counterparts, highlighting evident issues that necessitate domestic traditional archery equipment to undergo technological adoption and enhancement. Presently, domestic manufacturers and producers are in the process of accumulating experiential knowledge, with potential for refinement in areas such as product standardization and scientific rigor.

The educational significance of traditional archery manifests through its assimilation into contemporary sports curricula. The moral and ceremonial pedagogy intrinsic to traditional Chinese sports can be innovatively adapted and integrated into a modern holistic sports education framework, amalgamating Western sports technology instruction and fitness education to enhance both the physical and mental well-being of students (Zhang et al., 2023). Concurrently, safeguarding the cultural integrity of traditional sports is imperative, necessitating the extraction of favourable elements from diverse sports cultures. Building upon this foundation, the incorporation of traditional archery into university sports programs can facilitate the modernization of traditional Chinese sports within the context of the prevailing trend of global sports culture integration (Li & Xiang, 2016).

Korea stands out as one of the select nations that have consistently preserved and progressed in the realm of traditional archery without disruption. The enduring vitality and advancement of traditional archery in South Korea can be delineated through three pivotal milestones: a triumphant resurgence, steadfast establishment, and harmonious coexistence with Western-style archery (Kim, 2023). Japan has dedicated efforts to augmenting the technological sophistication of bows through the integration of advanced technology. For example, Mariani et al. (2022) present a systematic approach for the design and construction of bows utilizing FRP. The Turkish bow distinguishes itself as exceptionally effective within its category, characterized by a distinctive system comprising several discrete elements, each fulfilling a specific functional role. In their investigation of the Turkish bow, with specific focus on the war bow identified as Tirkeş, Demir and Ekici (2014) identify pivotal geometric parameters and examine their influence on bow performance. Additionally, introduce parametric optimization methodologies directed towards the maximization of the bow's efficiency.

Numerous scholars have scrutinized traditional archery research, delineating cultural significance, developmental positioning, educational value, health promotion, and technological enhancements as primary research orientations (see Table 1). Nevertheless, an examination of

extant literature on traditional Chinese archery exposes a dearth of bibliometric analysis and knowledge map visualization, especially in the examination of specific research topics. The absence of scientometric software complicates the attainment of a systematic and comprehensive objective and visual understanding of this enduring and venerable subject area.

3. Methods

This investigation utilized the China National Knowledge Internet (CNKI) database, offering access to a repository of over 10,000 influential academic journals and conference papers. Employing the search query $TS = (\text{Chinese traditional or Chinese}) \text{ archery and Art of Archery}$, we exclusively considered articles and reviews published from 2003 to 2023. Executed on October 14, 2022, the search yielded 387 outcomes, with 379 papers retained following the exclusion of irrelevant research. The selected literature was downloaded in the "complete record and cited references" format and stored as a plain text file for subsequent analysis.

This study utilizes bibliometric analysis and Citespace, an advanced bibliometric visualization tool created and regularly updated by Professor Chaomei Chen at Drexel University

(<http://cluster.cis.drexel.edu/~cchen/citespace/download/>), to scrutinize and evaluate the literature. Citespace facilitates graphical representations of countries/regions, authors, institutions, keywords, and various other facets within the chosen dataset (Chen, 2004, 2006). Following the acquisition of valid literature data from the CNKI database, the data underwent formatting and was exported in the Ref format. For the construction of the knowledge map in this study, Citespace 5.8.R 3e software was employed, and specific software settings were configured, designating the time range from 2003 to 2023, with each year treated as an individual time slice.

4. Results

4.1. Publication Trend Analysis

The outcomes of the quantitative analysis of archery-related literature in China retrieved from the China National Knowledge Internet (CNKI) database are illustrated in Figure 1. To a certain extent, the fluctuating number of published papers over time can be indicative of the dynamic evolution and developmental pace within this research domain. This study conducted a tally of the documents pertaining to archery subjects in the China National Knowledge Network (CNKI) database since the year 2003.

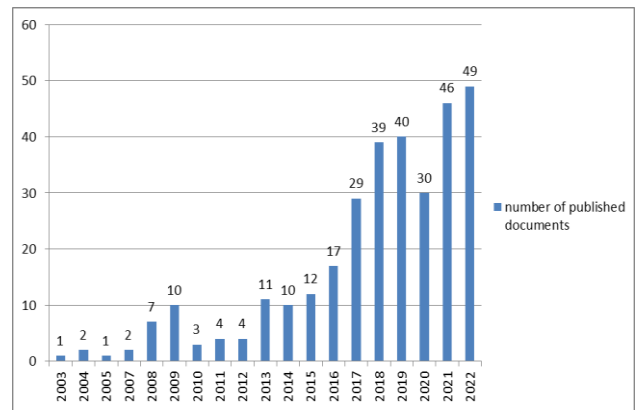


Figure 1. Statistics on the Variation Trend of the Number of Published Documents in Each Year of Chinese Archery Research During 2001-2022.

Figure 1 illustrates the developmental trajectory of archery-related literature from 2003, categorized into four stages: initial (2003-2007), rapid growth (2008-2009), stable development (2010-2016), and diversified development (2017-present). In the initial stage, research was exploratory, with limited literature. Scholars primarily concentrated on enhancing training performance of archery athletes, predominantly in competitive sports. The rapid growth stage witnessed a surge in literature, peaking at 29 articles in 2017. Subsequently, during the stable development stage, research enthusiasm persisted, with an average annual publication of around 30, reaching 40 in 2019. Post-2019, the number stabilized within an acceptable range. Scholars subsequently delved into more specialized archery research, conducting combined analyses to identify innovative focal points.

4.2. Cooperation Network Analysis

4.2.1. Authors Cooperation Network Analysis

Illustrated in Figure 2, author co-occurrence analysis, facilitated by CiteSpace software, unveils collaboration and mutual referencing patterns within a specific subject or field. Co-citation analysis of authors is performed to generate a visual map. The Betweenness Centrality, manifested as growth ring-like nodes, serves as a vital metric for evaluating the value of authors and literature. The analysis underscores characteristics of Chinese archery research, marked by partial concentration, overall dispersion, low density, and limited mutual citation. Typically, stable research teams consist of authors from the same institution, featuring one or more core members. Notably, the School of Sports Science at South China Normal University has Lv H.F., Ma L.Z., Bian Y., Feng J.Y., Luo C., Hong K., Shi Y.Q., and Ou Yang T.N. as its principal members, while Chen Y.S., Chang X.L., and Gong M.F. are affiliated with Chengdu Sports University, and Qiu P.X.J and Ji K.Z. are associated with Shanghai Sports University.

Qufu Normal University's core members include Ma L and Chen G.X. Additionally, cooperative groups led by Mao H.Y. and Cai Z. emerge as prolific publishers with close academic connections, whereas other author groups are generally characterized by smaller scale and shorter-term collaborations.

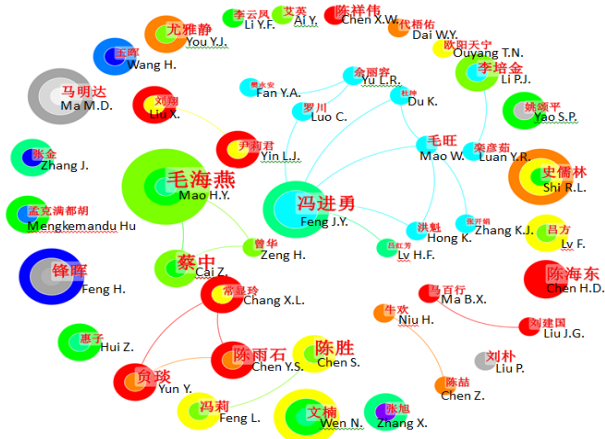


Figure 2. The Co-occurrence Map of Literature Authors in the Field of Archery in China From 2001 to 2022.

Derived from Table 2, it is evident that Mao H.Y. holds the foremost position in terms of publication volume concerning archery or shooting research, contributing a total of 7 publications. As indicated in Table 1, Mao H.Y. similarly emerges as the predominant author in the context of publication volume, having authored a cumulative total of 7 research papers on archery or shooting. Among them, Mao, Zeng, and Liu (2019) examined the contemporary cultural significance of traditional archery, underscoring its crucial role in advancing local sports and fostering the development of cultural tourism. Notably, CAI Z has contributed 5 articles, encompassing studies on the industrialization and dissemination of traditional Chinese archery sports events. Yun, Chen, and Chang (2022) conducted comprehensive research on the evolution, challenges, and remedies for traditional Chinese archery. Noted the increasing academic richness and expanding research perspectives, including enhancements in competition rules and the introduction of diverse events. Highlighted the active promotion of archery in universities through courses and competitions. However, challenges persist in theoretical research, incomplete competition and training systems, and divergent development models, prompting proposed targeted solutions. Zhang and Sun (2021) re-evaluated the significance and contextualization of Chinese traditional archery through the lens of Tao philosophy, advocating for a developmental stance termed "coexistence of skill and Tao." This proposed positioning aims to unveil the rational value inherent in traditional Chinese archery, affording a spiritual dimension for comprehending traditional Chinese sports beyond

instrumental rationality. Gong (2018) explored the cultural evolution in traditional Chinese archery, proposing guiding principles for its creative transformation. Emphasized the transformation direction of "uniting art with Tao, and attaining Tao through art," offering practical suggestions for implementation.

Table 2

The Top6 Authors Who Published Research on Traditional Archery

NO.	Publications	Years	Authors
1	7	2017	Mao H.Y.
2	5	2018	Cai Z.
3	5	2016	Feng J.Y.
4	5	2019	Chen S.
5	4	2021	Chen Y.S.
6	4	2008	Feng H.

4.2.2. Institution Cooperation Network Analysis

In this scholarly domain, the distribution of author institutions serves as an indicator of the resources and influence of diverse universities and institutions. Employing CiteSpace software, we performed a co-occurrence analysis of institutions in the field of archery research from 2003 to 2023. Each node in the resulting network map (Figure 3) represents a research institution, showcasing prominent research entities and their collaborative affiliations. Notably, physical education colleges, normal colleges, and comprehensive universities emerge as the primary contributors to archery research. However, numerous research institutions operate independently, leading to a dearth of resource sharing and incomplete integration of research outcomes. To propel breakthroughs in sports research within the context of national fitness, Chinese research institutions should actively engage in communication, fostering resource sharing and cohesive integration of research results.

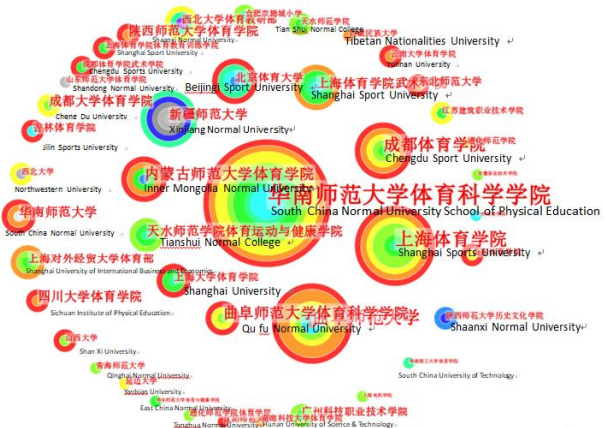


Figure 3. A Map of Institutional Co-occurrence of Archery Research in China From 2001 to 2022.

Table 3 outlines the top 6 research publications in archery from 2003 to 2023. Notably, the School of Sports Science at South China Normal University stands out with 28 research publications, making it the foremost institution in this field. In conjunction with Figure 3, the School of Sports Science at South China Normal University exhibits the highest publication count, followed by Shanghai Sports University, Qufu Normal University, and Chengdu Sports University, each contributing

11 research publications. South China Normal University holds a prominent position in archery research, emphasizing collaborations, particularly in exploring the history and evolution of archery. In contrast, Shanghai Sports University and Qufu Normal University concentrate on traditional archery culture and its preservation, while South China Normal University's research extends to encompass primitive archery activities, such as mural painting.

Table 3

Top 6 Research institutes in the field of traditional Chinese archery publications

NO.	Publications	Percentage (%)	Institutions
1	28	7.39	School of Sports Science, South China Normal University
2	12	2017	Shanghai Sports University
3	11	3.16	Qufu Normal University
4	10	2.64	Chengdu Sports University
5	7	1.85	School of Sports Science, Qufu Normal University
6	7	1.85	School of Physical Education, Inner Mongolia Normal University

4.3. Popular Research Topics and Trends

4.3.1. Keyword Co-Occurrence Clustering Analysis

The selected keywords offer a succinct encapsulation of the research themes and content found in the literature. Examining their co-occurrence network unveils the developmental history and contemporary research trends within the relevant field. This method facilitates a rapid comprehension for researchers regarding the dynamic evolution of diverse knowledge units within the domain (Wang et al., 2022). In this investigation, literature pertinent to traditional archery, sourced from the CNKI database, undergoes visualization analysis in CiteSpace, utilizing keywords as node types. The resultant co-occurrence network spectrum of keywords (Figure 4) is generated. Keywords, serving as highly compressed representations of the literature content, offer insights into the research topics as articulated by the authors. Through the analysis of keywords, a nuanced understanding of the research focus can be intuitively discerned. The identification of high-frequency keywords across the entire archery research domain effectively delineates the research hotspots within this field.

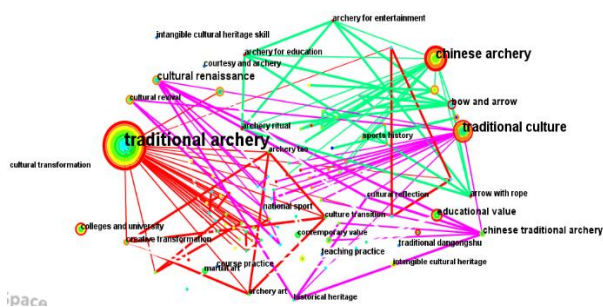


Figure 4. Keyword Co-occurrence Network in the Study of Chinese Traditional Archery.

In a comprehensive analysis of the keyword co-occurrence network structure, a pronounced cohesion is observed. "Traditional archery" emerges as the most frequently occurring keyword (40 times), succeeded by "Chinese archery" (15 times), "traditional culture" (14 times), "educational value" (5 times), "cultural renaissance" (4 times), "colleges and university" (4 times), and "traditional archery culture" (4 times). Keywords appearing three times include "development strategy," "sports culture," "Chinese traditional archery," "archery culture," "college students," "new era," and "bow and arrow." Notably, keywords with a co-occurrence network centrality exceeding 0.01 encompass "traditional archery" (0.36), "Chinese archery" (0.18), "traditional culture" (0.07), "educational value" (0.03), "cultural renaissance" (0.02), "colleges and university" (0.03), "Chinese tradition" (0.02), "bow and arrow" (0.02), "college students" (0.01), and "Shaolin Zen bow" (0.01) (Table 4). Repetition of keywords like "archery," "bow and arrow," and "Chinese archery" signifies their broad coverage, posing challenges in pinpointing the precise research direction. Conversely, keywords such as "traditional archery," "traditional culture," and "educational value" distinctly highlight the research hotspots in traditional archery. Moreover, "cultural renaissance," "cultural inheritance and development," "development strategy," and "educational value" are identified as prominent topics in the field. In recent decades, traditional Chinese archery has experienced rapid growth, finding extensive applications in modern sports curricula, competitive sports, and the commercialization of traditional sports events (Chen, 2017; Guo & Yao, 2007; Zhang et al., 2023).

Table 4

Top 20 Keywords in Terms of Frequency for Chinese Traditional Archery Research

NO.	Frequency	Centrality	Keywords
1	40	0.36	traditional archery
2	15	0.18	Chinese archery
3	14	0.07	traditional culture
4	5	0.03	educational value
5	4	0.02	cultural renaissance
6	4	0.03	colleges and university
7	4	0	traditional archery culture
8	3	0	development strategy
9	3	0	cultural revival
10	3	0	sports culture
11	3	0.02	chinese traditional archery
12	3	0	archery culture
13	3	0.01	college student
14	3	0	new era
15	3	0.02	bow and arrow
16	2	0	cultural heritage
17	2	0	development and evolution
18	2	0	ritual archery
19	2	0.01	shaolin Zen bow

Based on the clustering outcomes derived from the keyword knowledge graph (Figure 5), the focal areas of research in traditional Chinese archery revolve around cultural heritage and the rationality of educational value (Lv et al., 2017; Zhang et al., 2023). Traditional Chinese archery, with its extensive historical lineage, substantial practical utility, broad influence, and notable contributions, holds significant importance in the advancement of global sports (Ren, 2016). Notably, the harmonization of the arts and Tao philosophy has transformed Chinese archery into a dynamic embodiment of human enlightenment. The developmental trajectory embracing "art and Tao" facilitates the recognition of rational value within Chinese archery, thereby offering a spiritual orientation for traditional Chinese sports to transcend instrumental rationality (Zhang & Sun, 2021). These studies incorporate the traditional Chinese archery sports culture into modern sports education, aligning with the cultural values. Rooted in traditional Chinese culture, this comprehensive education contributes to the educational objective of "cultivating moral character and promoting all-round development." Furthermore, it is essential to accentuate the core value pursuit of traditional archery culture and delve deeper to establish, refine, and promote a modern archery culture with distinct Chinese characteristics (Tang, 2020). The imperative lies in reorienting the examination of traditional archery within a

macroscopic historical framework, underscored by the transformative "Chinese" context, and delving into the ontological essence of the subject matter. Analysing the dynamic cognition of the genesis and evolution of "Chinese archery" through the lens of "why it is" transcends the current emphasis on "nation-state" and "border" solemnity, proclaiming a subjective interpretation of the underlying question, "why Chinese archery is." (Yun & Hao, 2018). Chinese civilization, renowned for its emphasis on etiquette, undergoes contemporary reconstruction in conjunction with the cultivation of socialist core values. The incorporation of traditional archery, aligning with the value of "shooting to observe morality," into moral education in schools holds considerable significance and value.

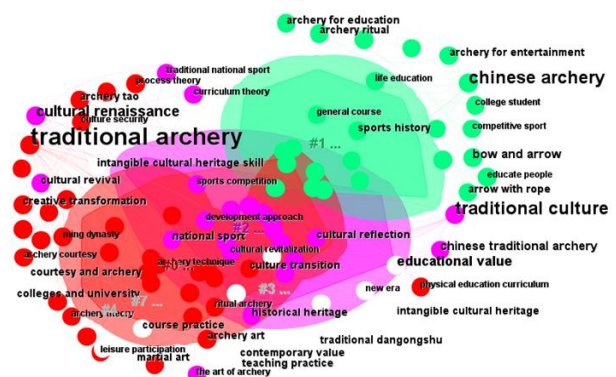


Figure 5. Keyword Clustering Analysis in the Study of Chinese Traditional Archery.

4.3.2. Timeline Visualization of Keyword Co-Occurrence Clustering Analysis

Cluster analysis reveals variations in the research emphasis on traditional archery during different periods ($Q = 0.8007 > 0.3$, $S = 0.9554 > 0.7$; Figure 6). In the early research stage (2003-2010), attention was directed towards Cluster #0 (Archery Philosophy) and Cluster #1 (Chinese archery). In recent years, Educational Value #3 and College and University Archery Courses #4 have emerged as prominent research areas. Notably, Cluster #2 (Traditional Culture) has gained emphasis. Consequently, research on traditional archery predominantly centres on educational value and traditional culture, with heightened attention towards the cultural inheritance and development of traditional archery. The exploration of traditional archery culture has become a notable research focus, particularly in the realm of Cluster #2 (Traditional Culture), indicating a trajectory towards the development of traditional archery courses. Cluster #7 (University) has emerged as an additional research focal point. The integration of Chinese traditional archery into university settings, transitioning from its folk origins, involves the incorporation of the modern "Internet

+" teaching mode. This integration encompasses the enhancement of teaching conditions, research capabilities, service levels, and cultural outreach within universities, aiming for a comprehensive advancement of Chinese traditional archery. Simultaneously, through curriculum construction and reform initiatives, it contributes to the enrichment of sports culture courses in universities. This undertaking bears the historical responsibility of

preserving traditional national culture and fostering cultural confidence among contemporary college students (Chen, 2019). Cluster #24 (Traditional Archery Development) exhibits close ties to contemporary competitive archery (Chen & Yun, 2021; Wu et al., 2022), nevertheless, recent years have witnessed a shift in research emphasis towards Cluster #3 (Educational Value), moving beyond the exclusive focus on modern competitive archery.

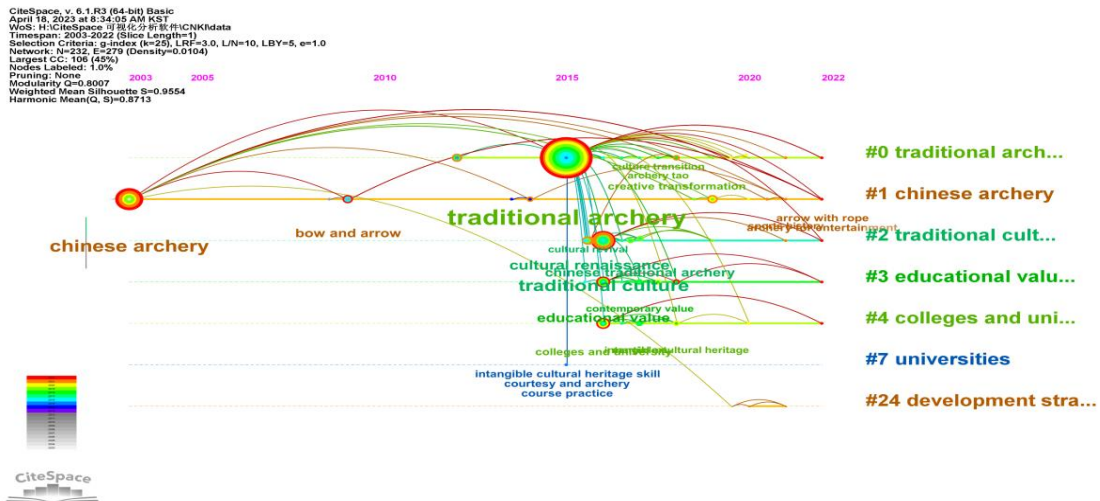


Figure 6. Timeline Visualization of Keyword Co-occurrence Clustering Analysis in the Study of Chinese Traditional Archery.

4.3.3. Keyword Burst Analysis

Analysis of burst keywords obtained from CNKI (Figure 7) reveals that research on traditional archery initially shifted from cultural transformation (Fang & Yao, 2018) to education value and development strategy, and in recent

years, towards curriculum, ideology, and politics (Fan & Zhang, 2022; Li & Luan, 2016). This suggests that examining the educational value of traditional archery can be effectively accomplished through the study of "shooting to observe morality" and "shooting incorporated into a ritual."

Top 16 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	2003 - 2022
cultural transformation	2008	1.28	2008	2009	[Timeline bar with red burst from 2008 to 2009]
bow and arrow	2009	0.64	2009	2016	[Timeline bar with red burst from 2009 to 2016]
cultural renaissance	2016	1.13	2016	2017	[Timeline bar with red burst from 2016 to 2017]
chinese traditional archery	2017	1.1	2017	2019	[Timeline bar with red burst from 2017 to 2019]
contemporary value	2017	0.98	2017	2018	[Timeline bar with red burst from 2017 to 2018]
martial art	2017	0.98	2017	2018	[Timeline bar with red burst from 2017 to 2018]
ancient china	2017	0.73	2017	2019	[Timeline bar with red burst from 2017 to 2019]
knowledge map	2017	0.73	2017	2019	[Timeline bar with red burst from 2017 to 2019]
cultural heritage	2017	0.73	2017	2019	[Timeline bar with red burst from 2017 to 2019]
development and evolution	2018	0.73	2018	2020	[Timeline bar with red burst from 2018 to 2020]
intangible cultural heritage	2018	0.73	2018	2020	[Timeline bar with red burst from 2018 to 2020]
educational value	2016	0.32	2018	2019	[Timeline bar with red burst from 2018 to 2019]
college student	2019	0.98	2019	2022	[Timeline bar with red burst from 2019 to 2022]
development strategy	2020	0.97	2020	2022	[Timeline bar with red burst from 2020 to 2022]
archery field	2020	0.9	2020	2022	[Timeline bar with red burst from 2020 to 2022]
curriculum ideology and politics	2020	0.9	2020	2022	[Timeline bar with red burst from 2020 to 2022]

Figure 7. Top16 Keywords with the Strongest Citation Bursts on Chinese Traditional Archery Research.

5. Discussion

(1) Integrating Traditional Archery Culture into Physical Education Curriculum: The convergence of morality, etiquette, art, and sports is essential. The concept of "Observing virtue through archery" holds significance in Chinese traditional archery culture, emphasizing the simultaneous pursuit of advanced archery skills and the cultivation of moral virtues and character expression during the archery process. The incorporation of archery into ceremonies represents a form of etiquette in Chinese traditional archery, necessitating adherence to specific rules and ceremonial norms during archery activities (Zhang et al., 2023). Presently, moral education relies heavily on theoretical teaching, leading to a lack of personal experiences for students and hindering the enduring influence on their behavioural habits (Yuan, 2022). Physical activities necessitate student participation and possess characteristics of perceptivity and practicability, rendering them more advantageous for the implementation of moral education (Friday et al., 2023). Chinese traditional archery prioritizes holistic cultivation encompassing physical and comprehensive development. This cultivation extends beyond textbooks, necessitating insights derived from practical experiences to deeply impact individuals. For instance, Mencius' statement, "When the arrow misses the target, one should reflect upon oneself," underscores the value of self-reflection, worthy of preservation (Ruan, 2009). Chinese traditional archery underscores the fusion of "skills and arts," transcending mere technological proficiency. The poetic portrayal, such as "pulling the bow like a full moon," vividly showcases the allure embedded in Chinese traditional culture. Regrettably, contemporary school education places excessive emphasis on knowledge and skill transmission, often neglecting etiquette education, resulting in a superficial approach to moral education (Xiang, 2023). Moral education holds paramount significance in contemporary curriculum design. Subsequent research endeavours should delve deeper into the assimilation of traditional archery culture into the contemporary physical education curriculum system. This integration aims to foster the development of exemplary societal individuals, characterized as "gentlemen."

(2) Traditional archery concurrently fosters physical well-being and mental refinement. Chinese archery, emblematic of traditional martial arts, has roots reaching back to the Stone Age, originally employed for hunting purposes. The evolution of Chinese archery encompasses archery rituals, identified as one of the fundamental skills mandated for students since the West Zhou Dynasty (1046 BC-771 BC).

Chinese archery has functioned as a conduit for expressing inner sentiments and emotive release within a ceremonial framework, accentuating the profound spiritual and psychological dimensions integral to its historical significance (Zhang & Yao, 2018). The discipline of Chinese archery underscores the harmony of mind and body, striving to cultivate both the practitioner's technical proficiency and their philosophical understanding of Tao (Selby, 2000). This methodology is perceived to yield two principal advantages. Firstly, it enhances physical health by improving muscle strength in the back and arms (Baifa, Xinglong, & Dongmei, 2023), as well as control of respiration, heart rate (Manuel Clemente et al., 2011), arousal system (Lu et al., 2021), and motor skills (Wang et al., 2022). Moreover, Chinese archery is thought to enhance mental cultivation, fostering qualities like self-reflection, self-regulation, concentration, discipline, and the development of virtues such as humility, respect, morality, and an understanding of Tao philosophy (Selby, 2000). Acknowledging its advantages, the Chinese government is revitalizing and endorsing traditional martial arts, including Chinese archery, to foster the well-being and development of youth. However, the public health advantages of Chinese archery have mainly relied on historical and expert insights, lacking substantial experimental evidence. Hence, future research should delve deeper into the impact of Chinese archery on both children and adults. For example, Liu et al. (2023) investigated the notable impacts of acute Chinese archery on three cognitive tasks, revealing that a singular session of Chinese archery elevated three subdomains of core executive functions in healthy preadolescent children.

(3) Exploring the production techniques and transmission routes of traditional bows and arrows is imperative. Given China's expansive geography, numerous ethnic groups boast distinctive archery cultures, each with its own historical trajectory of ethnic traditional archery development (Lu & Pan, 2018). Archery, embodying the cultural traits of diverse ancient ethnic groups, serves as a mirror reflecting distinct social histories. The standardization of traditional archery equipment plays a crucial role in promoting its recognition. Delving into archery culture unveils the unique wisdom, folk customs, philosophical thoughts, and inherent values of each ethnic group. Połec and Murawska (2021) argued that the sustenance and perpetuation of conventional handicrafts ought to encompass not only the circumstances of artisans but also incorporate the prospective consumers of merchandise crafted through traditional methodologies and designs. Nevertheless, the advent of competitive sports and the sway of contemporary Western archery have

precipitated the gradual waning of China's traditional archery culture, a phenomenon intricately intertwined with the preservation and advancement of said cultural heritage (Zhang, Wen, & Li, 2018). Traditional archery craftsmen have encountered significant constraints in inheriting archery production techniques due to a combination of economic, policy, and regional factors (Han, Wang, & Lin, 2007). The progression of traditional archery culture is hindered by limited development in equipment production and inheritance pathways, while Japanese Kyudo enjoys high esteem for its distinctive ethnic characteristics in bow and arrow production. Mariani et al. (2022) proposed a method for designing FRP bows using an inverse modelling approach simplifies limb deformation analysis. Despite Chinese Confucianism's influence, Japan's Kyudo adeptly preserves its cultural nuances. Future research in traditional archery will likely employ modern techniques to explore bow and arrow-making methods and inheritance paths.

(4) Advanced experimental techniques can enhance the athletic performance of traditional archers. Scientific experimentation in traditional archery aids in comprehending the sport's characteristics, discerning training principles and physiological adaptations, and elevating the standards of scientific training (Feng, 2022). Currently, foreign archery projects use systems such as the plantar pressure analysis system (Lam et al., 2019), the infrared motion test system (Kim, Kang, & Park, 2021a), the surface electromyography collection system (Antunes et al., 2023; Khodadadi et al., 2023) and modern information science technology (Butnariu et al., 2018) to monitor the training process, collect data information, and analyse technical movements. In addition, foreign scholars have conducted systematic studies on factors affecting archery performance (Kim, Kim, & So, 2015), psychological skill training for athletes (Kim et al., 2021b; Xu et al., 2023), displacement measurement during the final push-pull phase (Kim et al., 2021b), interpersonal communication in archery (Xue, 2022), and monitoring the muscle condition of archers (Butnariu et al., 2018). In recent years, China has increasingly emphasized the utilization of scientific experimental instruments and methodologies for conducting comprehensive analyses of archers. For example, Xu et al. (2023) studied the effectiveness of psychological training programs for Chinese elite archers using an ABA design. While current

high-level archery research on Chinese archers lags behind technological advancements, future studies should explore advanced experimental technologies to enhance archers' competitive abilities and research outcomes.

6. Conclusion and Limitations

This study analysed traditional archery literature from the CNKI core database using CiteSpace software for visual analysis. It examined collaborative relationships among publishing institutions, authors, and research trends, highlighting a network centred on South China Normal University, Shanghai University of Sport, and Qufu Normal University. Top authors include Feng J.Y., Mao H.Y., and Chen Y.S., showcasing a closely knit collaborative network. The study also explored research hotspots, inheritance paths, and relevant articles, proposing further research on the sports curriculum system, physical and mental health development, bow and arrow-making skills inheritance, and leveraging new technologies for enhancing archers' competitive abilities. The study aims to offer fresh theoretical perspectives for future traditional archery research in China.

However, this paper has limitations. It solely performed a visualization analysis of traditional archery literature from the CNKI core database. Future research could extend to the Web of Science and Scopus databases for more comprehensive insights. Moreover, while this study explored Chinese traditional archery's research hotspots, further investigations could delve into archery's cultural dissemination, curriculum development, policy implications, organizational management, and etiquette inheritance and development. Furthermore, as this study solely employed CiteSpace for visualization analysis, future research could explore alternative methods like VOSviewer (Kemeç & Altınay, 2023) that provides a unique approach to bibliometric mapping compared to other software such as SPSS and Pajek. The purpose of this methodology is to construct maps of authors or journals through the utilization of co-citation data and to generate keyword maps based on co-occurrence data. Furthermore, VOSviewer emphasizes the graphical depiction of bibliometric maps (Yang & Thoo, 2023). Furthermore, it provides various functionalities, among which is a text-mining feature enabling the production and visualization of correlations among cited articles (Shen & Wang, 2020).

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Table 1

List of Review Studies in the Field of Traditional Archery and CiteSpace

No.	Authors	methods	Contributions	conclusions or Limitations	Future trends
1	Ma (2004)	Literature Review	A study of the Chinese style of archery	Chinese style of archery	Archery in other countries
2	Mingyuan (2006)	Literature Review	A study of traditional Chinese culture from a historical materialist perspective	facilitate the modernisation of education in China today	Passing on and developing traditional Chinese culture
3	Cao and Feng (2008)	Literature Review	to explore and carry forward the archery culture	Mongolia archery	Other nationalities
4	Shen (2011)	Literature Review	explores cultural connotation and modern social value of Tibetan archery	Tibetan archery	Other nationalities
5	Yang and Li (2015)	Literature Review	the differences and characteristics of archery between the Sibe and Mongolian peoples	Sibe and Mongolian archery	Other nationalities
6	Li and Luan (2016)	Literature Review	traditional archery equipment development status	quality stability	production of normative or scientific
7	Choi and Ok (2016)	Literature Review	identified the role of the Korea National Archery Association	the foundation of the Korea Archery Association	educational methods and environments
8	Álvarez Solves et al. (2016)	A bibliometric	review of the international literature that used the paradigm of transformational leadership	book chapters and doctoral dissertations have not been considered	need to continue studying the impact of TL
9	Clancy, Herring, and Campbell (2017)	A bibliometric	evaluate the six most highly cited motivation measures in sport	contributes to the field of sport psychology	development of future questionnaires or alternative methods
10	Lv et al. (2017)	Literature Review	the recent ten years data of traditional archery competition	traditional archery and modern archery	Vulgarization and localization;
11	Baier-Fuentes et al. (2020)	A bibliometric	provide an overview of the academic research on emotions in the sport management field	several other influential documents may have been excluded from this analysis	extend or complement this bibliometric analysis to other databases
12	Zhang and Sun (2021)	Literature Review	In order to deeply explore the cultural value of Chinese Art of Archery	Traditional Chinese archery faces dilemma	Providing a spiritual dimension to traditional Chinese archery
13	Liu et al. (2022)	CiteSpace	explore the hot topics and prospects regarding adapted sport research	the study only focused on literature indexed from WOS	bibliometric analysis to other databases
14	Yang and Zhang (2022)	the soft power index model	explore cultural soft power	the low reliability of some indicators	Optimisation of indicators
15	Hahn (2022)	Access to literature	find out the educational characteristics of Hwalssogi(Korean Archery)	the Korean people and various sources of Korean archery	find the educational meaning of Korean archery
16	Pal Singh, Chakraborty, and Arora (2023)	A bibliometric	present a bibliometric and content analysis of the fan-sporting object relationship literature	The study limits itself to fan-sporting object relationship at a generic level	the impact of such granularities on the dimensions of this relationship
17	Coimbra et al. (2022)	VOSviewer software tool	analyzed scientific production in sport and exercise psychology (SEP) journals	with no inference analyze.	e-sports, virtual-reality, and technology
18	Xu et al. (2023)	An ABA design was adopted	Applying skill-oriented and spirit-oriented psychological training programmes	may not generalise to other athletes among various events.	More robust methods could be applied
19	Xu (2023)	Literature Review	Explored three basic principles for the revival of traditional Chinese archery	Only in the craft of bow and arrow making	Passing on and developing traditional Chinese archery
20	Ma (2023)	Literature Review	discusses traditional Chinese archery culture	settled during the Qing dynasty	A study of traditional archery in Chinese history
21	Liu et al. (2023)	Experimental methods	he impact of Chinese archery on children	The randomized trial was not conducted in the present study	The adolescent subpopulations with EF deficiencies or disorders
22	Kim (2023)	Literature Review	analyses how Korea's traditional archery has survived and developed into its current form	three important gateways	Based on these historical process
23	Zhang et al. (2023)	Literature Review	Exploring the Traditional Chinese Archery Sports Curriculum Model	Achieving the educational goal of "building moral character".	Combining traditional archery with a modern sports curriculum
24	Denche-Zamorano et al. (2022)	A bibliometric analysis	Cyberbullying and the Psychological Dimensions of the Self	may have excluded documents published in journals that were not indexed in it	Systematic reviews and meta-analyses could complement this research