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Article

Constructing a new model of public physical education teaching in universities based on the sports concept of bioinformatics technology, biological adaptability and biomechanics

Yanfei Liang

School of Education and Physical Education, Longdong University, Qingyang 745000, China; liangyanfei173312@outlook.com

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Abstract: The integration of bioinformatics, biological adaptations and biomechanics into public physical education offers a promising direction for enhancing sport science education. This article comprehensively explores the evolution of historical research in sport, not only through the lens of biological concepts but also incorporating biomechanical principles. It focuses on how adaptations, bioinformatics, and biomechanical analysis work in tandem to deepen our understanding of sport. By analyzing 514 articles published between 2000 and 2019, the study identifies trends in the study of sport history, particularly in the context of athletes' biological adaptations and their application in monitoring and enhancing physical performance techniques. Using CiteSpace visualization software, this paper constructs a knowledge map of key research themes and influential journals, demonstrating the dynamic development of the field. The research highlights how the biomechanical principles of adaptability, biological resilience and performance optimization are increasingly integrated into the study of sport history and physical education. Key findings include a staged trend in sport history research. The significant impact of biological adaptations, informed by biomechanical analysis, on training methods is evident. Bioinformatics further aids in processing and making sense of the vast amounts of biomechanical data collected. These insights suggest that integrating biological approaches into physical education teaching can significantly improve the theoretical and practical outcomes of physical education teaching in higher education. In addition, in an international comparative perspective, in the United States and Germany, college physical education teaching focuses more on optimizing athletes' performance through wearable technology and biomechanical modeling, whereas Japan and China pay more attention to the integration of traditional training methods with bioinformatics and biomechanical technology. This cross-national comparison not only reveals the characteristics of different countries in sport science education, but also provides a more comprehensive global perspective for future research.

Keywords: bioinformatics; biological adaptability; biomechanics; sports history; physical education; visualization

1. Introduction

A vital component of sports science, sports history holds an irreplaceable position in comprehensively grasping the development of physical activity and how it relates to culture, society, and individual performance [1,2]. Sports history examines how human biology, adaptation, and performance have influenced and been influenced by athletic activities across time. Not only does it explore the evolution and far reaching effects of various sports, but it also traces the mutual influence between them and human physical and mental states. More complex biological ideas have been included into the study of sports history as sports science

research has developed, especially with the remarkable development of bioinformatics technology [3,4]. This integration has led to a more profound understanding the physiological and adaptive mechanisms behind athletic performance, health, and injury prevention. The convergence of biology and sports history is now facilitating easier comprehension of these crucial aspects, opening new avenues for both fields [5].

For many years, biology—the study of life and living things—has been essential to comprehending human physique in sports. Exercise, training, competition, and other physical stressors cause the human body, a complex system, to constantly adapt. This adaptability is not merely a response to immediate physical demands but also a reflection of long-term evolutionary processes that have shaped human capabilities. Understanding how players' bodies change over time, react to training plans, heal from injuries, and perform at their best can be gained by researching biological adaptation in sports [6,7]. For instance, bioinformatics technology has made it possible to analyze athletes' genetic profiles in great depth, which has improved our understanding of how genetic factors affect physical skills and how they react to various forms of physical stress. This analysis extends beyond mere statistics; it delves into the intricate relationships between genes and performance, providing insights that can be used to enhance training methodologies and athlete care. Researchers may track how developments in sports science and technology have impacted our biological understanding of athletes and their bodies by connecting bioinformatics with sports history [8].

In recent years, the convergence of bioinformatics and biological adaptability has ushered in truly revolutionary and groundbreaking developments in the multifaceted realm of sports science. Bioinformatics, the multifaceted realm of the application of advanced computational techniques to meticulously analyze biological data—has rcompletely transformed the landscape of how we study biological processes, especially in terms of human physiology. It has opened up new horizons for in-depth exploration in this area. By integrating large datasets sourced from a wide array of channels, such as comprehensive genetic information, detailed training logs that record every workout session, and precise performance metrics that reflect an athlete's on field or on court achievements, researchers now have the remarkable ability to construct highly comprehensive profiles of athletes. These profiles serve as invaluable tools, effectively guiding both the formulation of optimal training plans and the design of efficient recovery strategies. By analyzing vast amounts of data, bioinformatics enables the identification of patterns in how athletes' bodies respond to different training regimens, recover from injuries, and adapt to varying physical demands [9,10]. This knowledge not only enhances the understanding of individual athletes but also contributes to the broader field of sports history by tracking the evolution of physical education and sports science over time.

The use of bioinformatics in sports research is not just about understanding the biological aspects of performance but also about using that information to inform practices in physical education [11]. This shift towards data-driven approaches signifies a paradigm change in how athletes are trained and how injuries are managed. For example, advancements in genetic testing have made it possible to tailor athletic training programs to an individual's genetic makeup. These

personalized training regimens are designed to optimize performance by aligning training methods with an athlete's unique biological profile, thus minimizing the risk of injury and enhancing recovery. This personalized approach helps maximize athletic potential by taking into account factors such as muscle fiber composition, metabolic rate, and recovery times. Moreover, understanding the genetic basis of athletic traits has implications for improving performance across a wide range of sports. This knowledge empowers coaches and trainers to make informed decisions that align with the physiological realities of their athletes, leading to more effective training outcomes.

Furthermore, the historical context of sports science provides a rich foundation for exploring the biological dimensions of physical education. The evolution of sports science is intertwined with broader societal changes, reflecting shifts in cultural attitudes towards health, fitness, and competition. As the field of sports history unfolds, it reveals how the study of human biology has influenced the development of training techniques, injury management, and performance enhancement. Historical analysis allows us to appreciate the milestones in sports science, such as the introduction of systematic training regimens in the early 20th century, which marked a significant departure from traditional, less structured approaches to physical training. Research in sports history can provide valuable insights into how the understanding of human biology evolved and how that evolution has shaped modern physical education. By examining pivotal moments, such as the establishment of exercise physiology as a distinct field, we can trace the lineage of current practices back to their origins.

By examining the historical trajectory of sports science, we can see how the scientific understanding of human biology and adaptation has transformed sports practices over time, leading to the development of more effective training methods and performance strategies. For instance, the shift from general fitness to sport-specific training reflects a deeper understanding of biomechanics and physiology, allowing athletes to train in ways that directly translate to improved performance in their respective sports. Additionally, historical perspectives on athletic training reveal how various cultures have approached physical fitness and competition differently, influenced by their unique social and environmental contexts. This cultural lens not only enriches our understanding of sports but also highlights the diverse ways in which societies value physical activity.

Moreover, the integration of technology in sports science has roots in historical advancements. From the early use of stopwatches and basic timing mechanisms to the sophisticated wearables and data analytics tools of today, technology has continually shaped how athletes train and compete. This historical perspective underscores the importance of viewing sports science as a dynamic field that evolves in response to both scientific advancements and cultural shifts. As we look to the future, it is crucial to consider how emerging technologies, such as artificial intelligence and machine learning, will further impact our understanding of athletic performance and training methodologies.

In conclusion, the intersection of sports history, biology, and bioinformatics is not merely an academic pursuit; it has real-world implications for athletes, coaches, and the broader community. As we continue to unravel the complexities of human

performance through the lens of history and science, we pave the way for innovative practices that can enhance athletic performance and promote health and well-being. The ongoing dialogue between these fields will undoubtedly lead to new discoveries that will shape the future of sports science, ensuring that athletes can achieve their full potential while minimizing the risks associated with physical competition. Ultimately, the journey of understanding human biology in sports is a testament to our relentless pursuit of knowledge, innovation, and excellence in physical performance.

2. Knowledge graph architecture

Google initially introduced the Knowledge Graph concept in 2012 with the goal of improving its alerting and intelligent search capabilities [12]. Knowledge graphs typically use triples to represent and store real-world entities and relationships. The head entity, relationship, and tail entity—also referred to as the subject, predicate, and object—are the three components that make up a triple. These components work together to form a structured representation of knowledge, enabling more nuanced and context-aware search results. Each triple encapsulates a specific piece of information, allowing for a rich interconnection of data points. For example, a triple might represent the relationship between a person, their occupation, and the organization they work for, thereby creating a more comprehensive understanding of that individual's context. Three pieces make up a significant portion of triples. **Figure 1** shows a knowledge graph that illustrates the intricate knowledge network structure inside the graph.

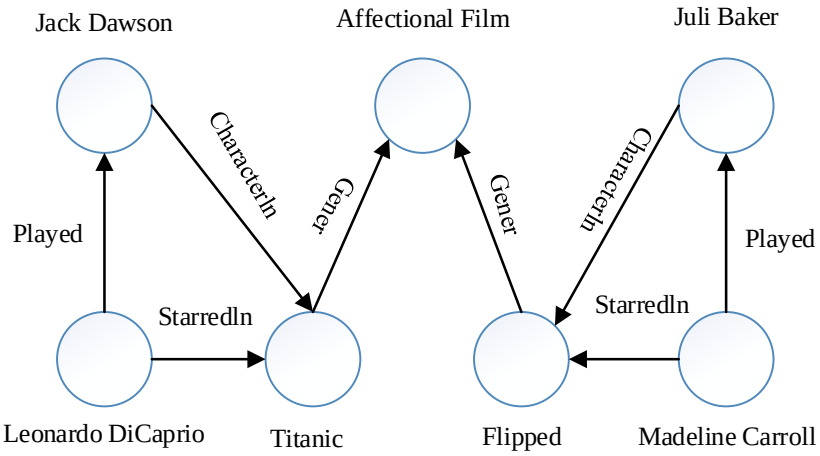

Figure 1. Example of knowledge map.

This paper comprehensively uses Graphpad Prism7 software and CiteSpace 5.6R2 visualization software for data analysis. The nodes select author (Author), institution (Istitution) and keywords (Keyword) respectively, all of which are network clipped, and corresponding knowledge map is obtained after operation. The quantitative analysis of drawn sports history knowledge map, specific process is shown in **Figure 2**:

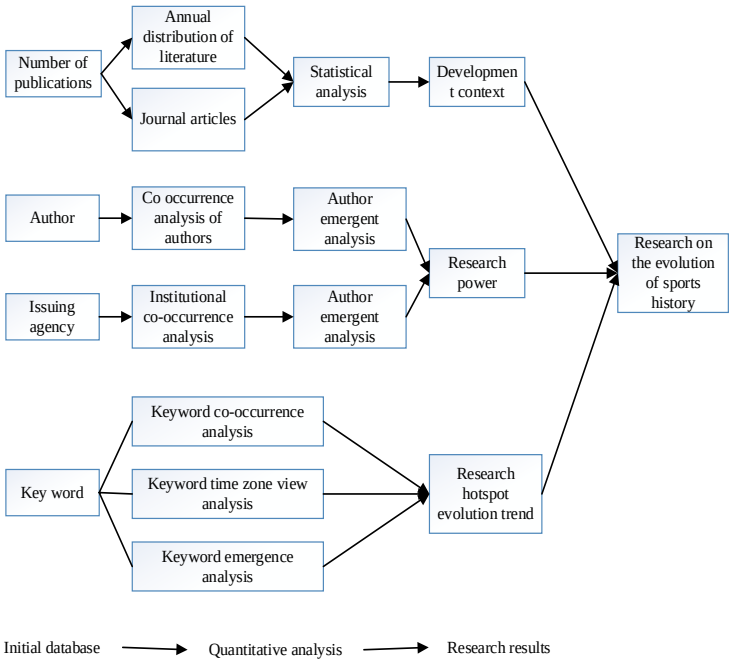

Figure 2. Quantitative analysis process of sports history knowledge.

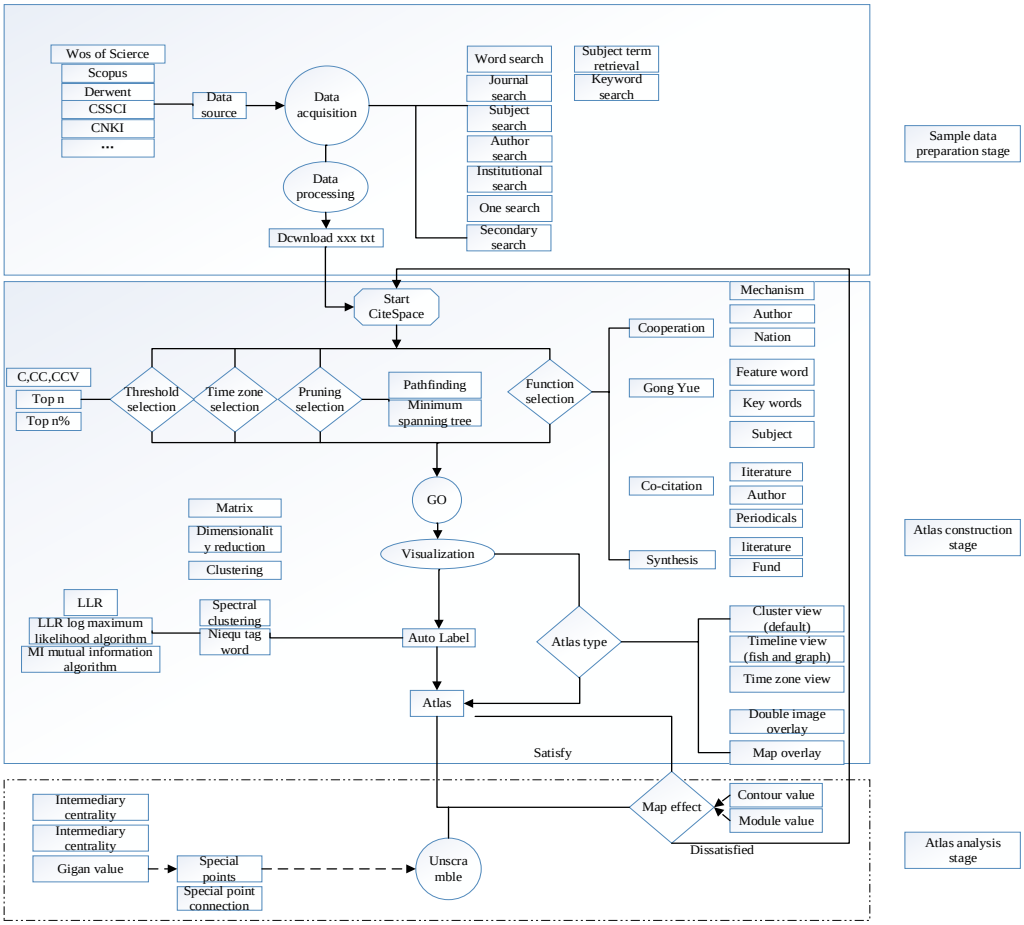

Figure 3. Flow chart of construction steps of physical education knowledge map in China.

Since main advantage of CiteSpace software lies in co-citation analysis of documents and detection of knowledge base and research fronts through clustering

of co-citation networks (or hybrid networks), this paper selects Chinese social science citations with reference information. Index (CSSCI) database to collect text data in field of physical education in my country. The specific operation process is shown in **Figure 3**.

The random walk process is essentially a random process on a special Markov chain, which is a random process with no aftereffect. The state of chain is irrelevant and is only determined by state of current chain. The random walk process that satisfies above conditions can reach a stable state after enough rounds of walking. At this time, initial probability matrix will maintain a relatively stable value, and will not change as walk process continues [13] produce big changes. **Figure 4** can briefly describe this process:

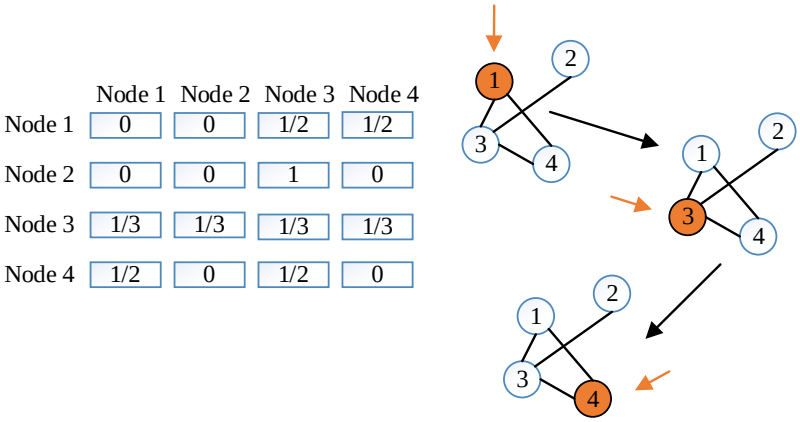

Figure 4. Schematic diagram of random walk model.

The data organization form in the item-based collaborative filtering model is similar to that of the random walk model in Chapter 3, but it undergoes some deformation to become a bipartite graph. Before and after transformation, the attribute graph structure looks like this. According to **Figure 5**:

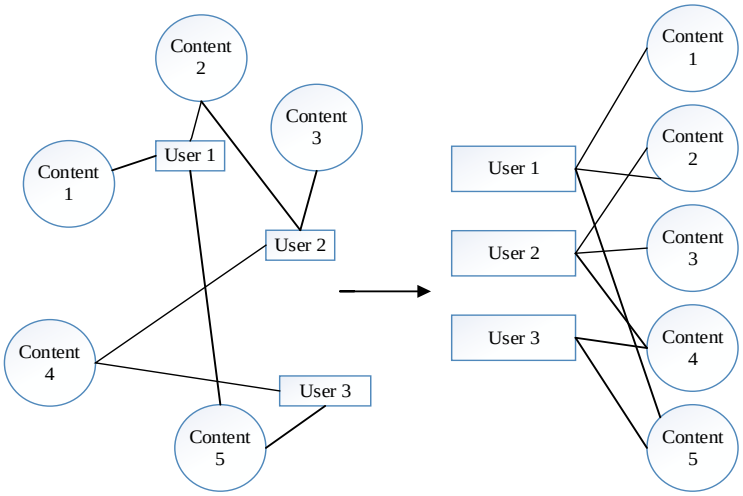

Figure 5. Attribute graph model transition diagram in random walk model.

3. Random walk association algorithm

For a node $x^{(t+1)} \in R^{t\times N}, x^{(t+1)} = (1-s)x^{(t)}P + sx^{(t)}I = (1-s)x^{(t)}P + sx^{(t)}$, P is transition matrix; I is identity matrix; s is stay probability.

One-step transition probability $(j \to k)$.

$$P_{t+l|t}(k \mid j) = \begin{cases} (1-s)C_{jk} / \sum_i C_{ji} \ \forall k \neq j \\ s \ when \ k = j \end{cases} \tag{1}$$

Among them, C_{jk} is original value; s represents self-transition probability.

t-step transition probability $(j \to k)$.

$$P_{t|0}(k|j) = [A^t]_{jk} \tag{2}$$

Among them, A represents transition probability matrix (row normalized).

Based on Bayes' rule, probability of starting at k and ending at j can be expressed as follows:

$$P_{0|t}(k|j) \infty P_{t|0}(j|k)P_0(k) \tag{3}$$

$$P_{0|t}(k \mid j) = \left[A^t Z^{-1}\right]_{kj} \ Z_{jj} = \sum_i \left[A^t\right]_{ij} \tag{4}$$

If A is a sparse matrix, it can be quickly calculated by following simplified method:

$$P_{0|t}(k|j) = \left[\frac{1}{Z_j} A(\ldots(A(q_j)))\right]_k \tag{5}$$

$$P_{0|t}(k|j) = \left[(((v_j A)A)\ldots)A\right]_k \tag{6}$$

For a node, $x^{(t+1)} \in R^{l\times N}$.

$$x^{(t+1)} = (1-\beta)x^{(t)}P + \beta\frac{1}{N}1 \tag{7}$$

Among them, this formula is used in Pagerank algorithm. Pagerank random jump operation can be described as follows:

Surfers can jump from a node to any node on web graph. Assuming that number of all nodes in Web graph is N, then random jump operation makes surfer jump to each node with probability $1/N$.

Add a random jump operation to random walk process:

1) When node is not out of chain, surfer calls random jump operation;
2) when node contains outbound link, surfer will call random jump operation with probability of $0 < a < 1$, and continue random walk with probability of $1 - a$, where a is a fixed parameter selected in advance, and value of a is generally 0.1.

For a node, $x^{(t+1)} \in R^{l\times N}$,

$$X^{(t+1)} = (1-\gamma)x^{(t)}P + \gamma e_x \in \{0,1\}^{l\times N} \tag{8}$$

$e_x \in \{0,1\}^{l\times N}$ is a vector, x th element is 1, and other elements are all 0. Among them, PersonalizedPagerank adopts this form. e_x is called restart vectorr.

$$\begin{aligned} x^{(1)} &= (1-\gamma)e_x P + \gamma e_x \\ x^{(2)} &= (1-\gamma)x^{(t)}P + \gamma e_x \\ &= (1-\gamma)\left[(1-\gamma)x^{(t)}P + \gamma e_x\right] + \gamma e_x \\ &= (1-\gamma)^2 e_x P^2 + \gamma(1-\gamma)e_x P + \gamma e_x \\ x^{(3)} &= (1-\gamma)x^{(2)}P + \gamma e_x \\ &= (1-\gamma)[(1-\gamma)^2 e_x P^2 + \gamma(1-\gamma)e_x P + \gamma e_x] + P + \gamma e_x \\ &= (1-\gamma)^3 e_x P^3 + \gamma(1-\gamma)^2 e_x P^2 + \gamma(1-\gamma)e_x P + \gamma e_x \end{aligned} \tag{9}$$

When converging, we get steady-state probability:

$$x = (1-\gamma)xP + \gamma e_x \Rightarrow x = \gamma e_x[I-(1-\gamma)P]^{-1} \tag{10}$$

From this, we get that for different nodes, just change e_x, that is, take a certain row for $[I-(1-\gamma)P]^{-1}$. $[I-(1-\gamma)P]^{-1}$ is also known as random walk kernel, which is kernel of random walk.

The relevant symbols are defined as follows:

G : Click matrix (n query and m doc).

$$G = [g_{ij}]_{(n+m)\times(n+m)} \tag{11}$$

$P = [P_{ij}]_{(n+m)\times(n+m)}$: Initial probability transition matrix.

$$P_{ij} = g_{ij} / \sum_k g_{ij} \in [0,1] \tag{12}$$

$A = [a_{ij}]_{(n+m)\times(n+m)}$: Transition matrix with self-jump.

$$a_{ij} = \begin{cases} (1-s)P_{ij}, i \neq j \\ s, i = j \end{cases} \tag{13}$$

$$A = (1-s)\times\begin{bmatrix} O_{n\times n} & Q \\ D & O_{m\times m} \end{bmatrix} + s\times I \in R^{(n+m)\times(n+m)} \tag{14}$$

When S = 0,

$$A = P = \begin{bmatrix} O & Q \\ D & O \end{bmatrix} \in R^{(n+m)\times(n+m)} \tag{15}$$

Among:

$$D = \left[D_{dq}\right]_{m\times n} \in R^{m\times n} \; Q = \left[Q_{dq}\right]_{n\times m} \in R^{n\times m} \tag{16}$$

G is a symmetric matrix; Q is a (query, doc) row-normalized matrix; D is a (doc, query) row-normalized matrix; I is an identity matrix.

Forward Random walk:

$$P_{t|0}(d|q) = [A^t]_{qd}, A^t = A\times A... \tag{17}$$

Backward Random Walk:

$$P_{0|t}(d|q) = [A^t Z^{-1}]_{qd}, Z = diag(A^t 1) \quad (18)$$

4. Results

The annual publication volume of literature with sports history as a research theme since 2000 is depicted in **Figure 6**, and it can be roughly divided into three stages: The first stage, which spans from 2000 to 2005, is characterized by relatively slow sports history research and a relatively small number of publications annually; the second stage saw the rapid development of sports history research from 2006 to 2014, with two periods of peak publications: 2010 (52 papers) and 2014 (61 papers); the third stage was from 2015 to 2019, during which time the number of published articles declined annually, indicating a negative trend.

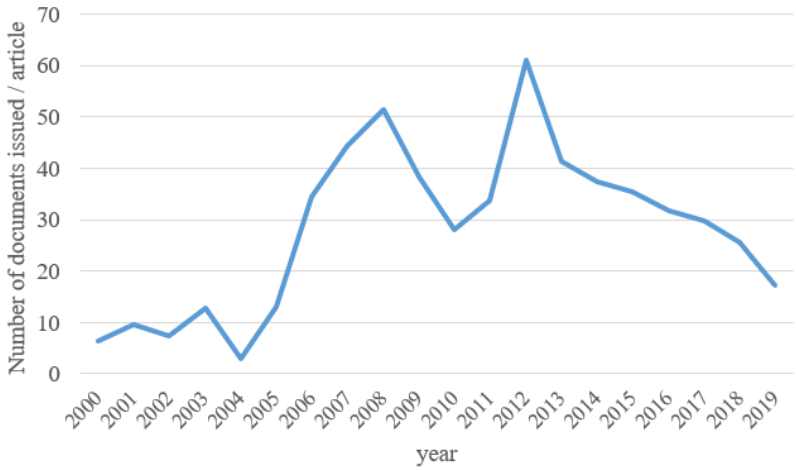

Figure 6. Annual document issuance.

It can be seen from **Figure 7** that core journals with largest number of articles are Sports Culture Guide, with 308 articles, accounting for 59.92% of total; in top ten journals, except Lantai World, rest are sports professional academic journals. In addition, sports history research journals involve a total of 45 core journals, covering a few types of journals, mainly sports journals.

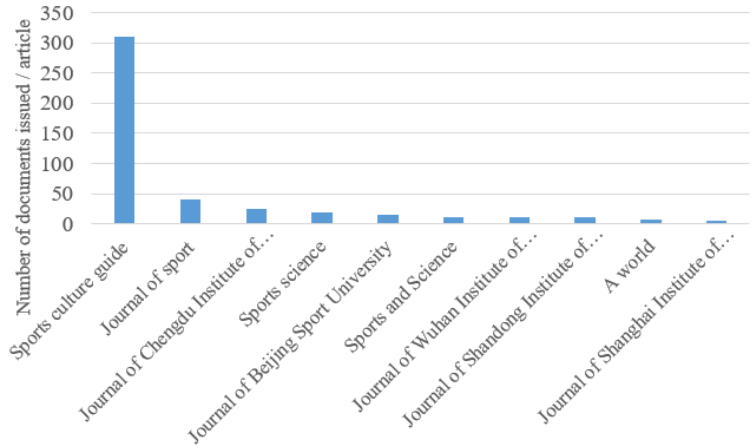

Figure 7. Annual document issuance.

The co-occurrence knowledge map of high-yield writers in the subject of sports history study is displayed in **Figure 8**. A greater number of the author's publications corresponds to a larger node and name in the figure. Wang Junqi, Gao Qiang of East China Normal University, Tian Biao and Tang Yongqian of Nanjing Institute of Physical Education, Zhao Yi of Soochow University, Pan Hua of Chengdu Institute of Physical Education, Liu Pu of Shandong Normal University, and others are evidently the authors with the most publications [14,15]. The more closely writers cooperate, the more it is evident that author distance in the field of sports history study is somewhat dispersed and that cooperation needs to be further enhanced.

Figure 8. Co occurrence map of authors.

Figure 9 and **Table 1** are author's emergent views. The greater emergent intensity, more important content to be reflected. It can be seen from **Figure 9** that authors with higher emergent intensity are Gao Qiang, Tang Yongqian, Tian Biao, Zhao Yi and Liu Pu. Above 3, this shows that above five authors had a certain influence in field of sports history research from 2000 to 2019. The longer line segment marked with dark color in **Figure 5**, longer author's emergence duration, as can be seen from **Figure 9** Wang Junqi (7 years), Gao Qiang (6 years), Pan Hua (5 years), Zhao Yi (4 years), Zhou Ya, Ting (4 years) and Wang Zhaoli (4 years) had longer emergent durations, with an average duration of 5 years, which shows that these 6 authors have been studying sports history for a long time.

Authors	Year	Strength	Begin	End	2000–2019
Gao Qiang	2000	4.56	2013	2019	
Tang Yonggan	2000	3.65	2019	2019	
Wang Junqi	2000	3.45	2013	2019	
LIU Jinggang	2000	3.04	2007	2019	
Weng Shixun	2000	2.56	2006	2019	
Li Shihong	2000	1.59	2010	2019	
Zhou Yating	2000	1.77	2013	2019	
Wang Shaoli	2000	1.74	2004	2019	
Wei Wei	2000	1.72	2019	2019	
NieXiao Hu	2000	1.53	2018	2019	

Figure 9. Author emergent view.

Table 1. High yielding authors in field of sports history research in China.

Serial number	Author	Number of documents issued	Author unit
1	Wang Junqi	13	School of Physical Education, Nanchang Aviation University
2	Cui Lequan	8	State Sports General Administration Sports Culture Development Center
3	Gao Qiang	7	School of Physical Education and Health, East China Normal University
4	Weng Shixun	6	Zhejiang University
5	Pan Hua	6	Chengdu Institute of Physical Education
6	Tang Yongqian	4	Sports Culture Center of Nanjing Institute of Physical Education
7	Luo Shiming	4	Soochow University School of Physical Education
8	Zhang Baoqiang	4	Xianyang Normal University
9	Zhou Yating	4	Soochow University School of Physical Education
10	Tianbiao	4	Sports Culture Center of Nanjing Institute of Physical Education

From **Figure 10**, it can be seen that School of Physical Education and Health of East China Normal University, School of Sports Science of South China Normal University and School of Physical Education of Soochow University are among top in country in terms of number of published papers. Cross-regional and interdisciplinary research needs to be strengthened.

Figure 10. Mechanism co-occurrence map.

Figure 11 and **Table 2** are emergent views of top 10 institutions in terms of emergent intensity. It can be seen that highest emergent intensity is Institute of Physical Education History of Chengdu Institute of Physical Education, followed by Institute of Physical Education of Soochow University, produced a wealth of research results, and has a certain influence in field of sports history research, but research strength has gradually weakened in recent years; School of History and Culture of Northeast Normal University and School of Wushu of Shanghai Institute of Physical Education have begun to emerge in recent years, which are future sports history. A new force in research.

Institutions	Year	Strength	Begin	End	2000–2019
Institute of Sports History, Chengdu Institute of Physical Education	2000	4.53	2008	2019	
School of Physical Education, Soochow University	2000	4.29	2006	2019	
School of Physical Education and Health, East China Normal University	2000	3.56	2009	2019	
School of Physical Education, Nanchang Hangkong University	2000	3.47	2011	2019	
Sports Culture Development Center of General Administration of Sport of China	2000	3.21	2013	2019	
School of History and Political Science, Guizhou Normal University	2000	2.15	2017	2019	
School of History and Political Science, Guizhou Normal University	2000	2.46	2008	2019	
Sports culture Center of Nanjing Institute of Physical Education	2000	2.11	2007	2019	
School of History and Culture, Northeast Normal University	2000	1.32	2016	2019	
Wushu Institute of Shanghai Institute of Physical Education	2000	1.02	2008	2019	

Figure 11. Organization emergent view.

Table 2. Top 10 scientific research institutions of sports history research in China.

Ranking	Scientific research institution	Number of documents issued (articles)	Provinces and cities
1	Chengdu Institute of Physical Education Institute of Sports History	33	Chengdu, Sichuan Province
2	State Sports General Administration Sports Culture Development Center	18	Beijing
3	Soochow University School of Physical Education	17	Suzhou City, Jiangsu Province
4	School of Sports Science, South China Normal University	15	Guangzhou, Guangdong
5	School of Physical Education and Health, East China Normal University	7	Shanghai
6	Beijing Sport University	6	Beijing
7	School of Physical Education, Nanchang Aviation University	5	Nanchang, Jiangxi Province
8	Qi Culture Research Institute, Shandong University of Technology	4	Zibo City, Shandong Province
9	Huaibei Normal University School of Physical Education	4	Huaibei City, Anhui Province
10	Shanghai Institute of Physical Education	4	Shanghai

It can be seen from **Figure 12** that high-frequency keywords that co-occur with subject heading sports history mainly include sports culture, sports thought, modern sports, school sports, sports history, Chinese martial arts, etc. The characteristics of external development and extension, in addition, there are many connections between each keyword, and color is mainly light, indicating that research perspective of sports history is richer, and it has formed a relatively stable and orderly development context. The results of sorting word frequency and centrality show that sports culture, sports thought, modern sports, school sports, and China are keywords with high word frequency and centrality. It can be seen that above keywords are development in field of sports history research cutting edge.

Figure 12. Keyword co-occurrence view.

Table 3. Top 20 keywords of word frequency and centrality.

Serial number	Key words	Word frequency	Year of appearance	Key words	Centrality	Year of appearance
1	Sports history	368	2000	Sports history	0.58	2000
2	Sports culture	30	2008	Sports culture	0.2	2008
3	Sports thought	30	2008	Sports history	0.16	2000
4	Modern sports	30	2008	Modern sports	0.14	2008
5	China	20	2008	School sports	0.14	2007
6	School sports	20	2007	Sports thought	0.12	2008
7	Sports history	19	2000	China	0.12	2008
8	Physical education	18	2002	National traditional sports	0.12	2010
9	Physical education	18	2004	History of ancient Chinese sports	0.11	2002
10	Modern	14	2010	Competitive sports	0.09	2008
11	Martial arts	13	2009	Sports heritage	0.07	2009
12	National traditional sports	12	2010	Physical education	0.06	2002
13	Competitive sports	11	2008	Modern	0.06	2002

Table 3. (*Continued*).

Serial number	Key words	Word frequency	Year of appearance	Key words	Centrality	Year of appearance
14	Sports philosophy	8	2006	Physical education	0.05	2004
15	Republic of China	7	2014	Sports philosophy	0.05	2006
16	Cuju	7	2008	Chinese traditional sports	0.05	2000
17	Chinese sports history	7	2001	Sports diplomacy	0.04	2009
18	History of ancient Chinese sports	6	2002	Sports management	0.04	2009
19	Ancient sports	6	2008	Sports	0.04	2003
20	Song Dynasty	6	2010	International Olympic Sports	0.04	2000

Table 3 illustrates the two developmental stages of high-frequency keywords in the field of sports history research from 2000 to 2019: The first stage, which spanned 2000 to 2014, featured a wealth of accomplishments, broad research perspectives, and numerous high-frequency keywords; the second stage, which spanned 2015 to 2019. At this point, there aren't many high-frequency terms. The yearly volume of publications is consistent with this tendency. It is evident that since 2015, domestic academics have focused more of their studies on sports history on value orientation and the evolution of sports connotation.

5. Conclusion

In this paper, 514 articles on the topic of "history of sports" included in China Knowledge Network (CNKI) were used as data sources, and CiteSpace V was used as a research tool for visualization and analysis. The study aims to explore the progress of the research on the history of sports in China, to grasp the cutting-edge dynamics of the research on the history of sports, and to promote the development of the theoretical research and practice of the history of sports in China. This analysis not only highlights the quantitative aspects of the research output but also emphasizes the qualitative dimensions, such as the themes and methodologies prevalent in the field. The results of the study show that the number of articles published in the field of sports history in China shows a fluctuating growth trend, and the high-yield research institutions are mainly concentrated in the Institute of Sports History of Chengdu Institute of Physical Education, the Sports Culture Development Center of the General Administration of Sport of the State Council of the People's Republic of China, the School of Physical Education of Soochow University, and the School of Sports Science of South China Normal University, etc. These institutions have established themselves as leaders in the field, contributing significantly to both academic research and practical applications of sports history. High-yield authors on sports history research are mainly represented by scholars such as Wang Junqi, Cui Lequan, Gao Qiang, Weng Shixun, and Pan Hua. Their contributions not only enrich the academic discourse but also inspire emerging researchers in the field. The research hotspots focus on the fields of sports history,

school sports history and cultural history. These areas reflect a growing interest in understanding the broader societal implications of sports, including how historical contexts shape contemporary practices and beliefs.

On this basis, the impact of these research results on the practice of physical education, as well as the possible challenges and opportunities are discussed in depth. From the perspective of practice, these studies not only help to better understand the historical development of physical culture, but also provide a theoretical basis for the improvement of school physical education curriculum design and teaching methods. By integrating historical insights, educators can develop more relevant and engaging curricula that resonate with students' experiences and societal values. At the same time, the studies also reveal the regional differences and historical patterns in the dissemination of sports culture, providing ideas for promoting the innovative development of sports culture in the new era. However, this field still faces challenges such as insufficient diversity of research methods and limited interdisciplinary cooperation. Understanding these regional dynamics is crucial for tailoring interventions and programs that are culturally and contextually appropriate. Future research can make further efforts in integrating multidisciplinary perspectives and expanding international comparative studies to better serve the practice of physical education and cultural communication. Such approaches could foster richer insights and more robust solutions to the challenges faced in the realm of sports history and its applications. By embracing a more holistic view, researchers can contribute significantly to the advancement of both theory and practice in the field.

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