

# ASEAN Journal of

Sports for Development and Peace



Journal homepage: <u>https://ejournal.upi.edu/index.php/ajsdp/</u>

## The hot spots and frontiers of student's physical health research in China

Li Shilan, Xiao Feng

Institute of Physical Education, Gannan Normal University, Ganzhou City, Jiangxi Province, China \*Correspondence: E-mail: <u>3354623277@qq.com</u>

## ABSTRACT

The physical health of students has always attracted much attention. This study takes CNKI's core journals as the data source, uses citespace software to draw maps for visual analysis, and sorts out 506 literature under the theme of physical health of Chinese students from 1993 to the present from the aspects of annual publications, authors, institutions and keywords. The following conclusions were drawn: since 1993, the number of articles published on students' physical health has shown an increasing trend and fluctuated slightly; The number of publications published by various authors and institutions is small, no core research team has been formed, and the contacts are relatively scattered; The hot areas and frontiers of student physical health research in China mainly focus on the research on the current situation of students' physical health, the standards and evaluation of students' physical health measurement, etc. Future research hotspots may be health promotion and student physical health research analysis. It is suggested that future scholars can strengthen cross-regional cooperation and exchanges, expand research perspectives and methods, and further improve the construction of the research system, to achieve national fitness at an early date.

© 2023 ASEAN Journal of Sport for Development and Peace

## ARTICLE INFO

Article History: Submitted/Received 19 Oct 2024 First Revised 09 Nov 2024 Accepted 01 Dec 2024 First Available online 31 Jan 2025 Publication Date 31 Jan 2025

#### Keyword:

Student, Physical health, Visual analytics

#### 1. INTRODUCTION

In recent decades, China has experienced rapid socio-economic development, accompanied by significant improvements in public health and nutritional standards. These changes have positively influenced the general physical condition of the population. However, despite these gains, the physical health of children and adolescents remains a growing concern. The results of the Eighth National Student Physical Fitness and Health Survey revealed that only 23.80% of students aged 6 to 22 years attained an "excellent" level of physical fitness (Department of Physical, Health and Arts Education, Ministry of Education, 2021). This finding underscores a paradox: while the overall health environment has improved, students' physical fitness levels are not keeping pace, raising questions about the effectiveness of current school-based physical activity policies.

Several studies have highlighted the consequences of inadequate physical health among students. For instance, low physical fitness levels have been linked to decreased academic performance, reduced attention span, and heightened risks of chronic conditions such as obesity and myopia (Hua et al., 2022; Yang et al., 2022). These issues are not merely individual but reflect broader systemic challenges in educational and public health structures. As physical education curricula become increasingly marginalized in favour of academic content, the role of structured physical activity in child development has been weakened, thereby impacting long-term health outcomes (Wu & Ji, 2023).

Over the past 30 years, research on student physical fitness in China has grown considerably, both in terms of volume and sophistication. With the institutionalization of physical fitness monitoring systems—such as the "National Student Physical Health Standard"—China has committed to tracking youth health more systematically (Zhang et al., 2020; Gao, Zhao, & Luo, 2015). However, these initiatives also face implementation challenges, such as inconsistent testing procedures, inadequate follow-up interventions, and a lack of public awareness regarding test results (Zhang et al., 2021). These gaps in the system highlight the importance of not only generating data but also translating it into actionable strategies.

In response to these developments, scholars have employed bibliometric and visual analytic techniques to map the landscape of physical health research. Tools like CiteSpace allow researchers to analyze co-authorship networks, identify knowledge clusters, and detect research frontiers (Gong et al., 2021). Such methods have become essential for synthesizing large volumes of literature and identifying emerging trends that may shape future interventions. They also provide insights into which institutions and scholars are leading the field, offering opportunities for collaboration and policy influence.

This study aims to provide a comprehensive visual analysis of literature on students' physical health in China, using data from the China National Knowledge Infrastructure (CNKI) spanning from 1992 to 2023. By analyzing publication trends, author and institutional networks, and keyword co-occurrences, this research seeks to summarize the development trajectory, hot topics, and scholarly characteristics in the field. Ultimately, it hopes to deepen understanding of how the academic community has addressed issues of student physical fitness and to inform strategies for enhancing physical education in alignment with China's broader goal of becoming a global sports power.

## 2. METHODS

### Literature search

For this study, the primary data source was the China National Knowledge Infrastructure (CNKI) database, a comprehensive collection of academic literature in China. To ensure relevance to the research topic, a systematic search was performed using specific subject terms, including "physical health" and "students' physical health." The search was further refined by limiting results to publications categorized under "Peking University Core," "CSSCI" (Chinese Social Sciences Citation Index), or "CSCD" (Chinese Scientific and Technical Journals Database), which represent the highest quality and most impactful academic sources in China.

The search period spanned from 1992 to August 4, 2023, capturing a broad array of studies conducted over the past three decades. Initially, the search yielded 836 records, which included a wide range of academic papers, theses, conference proceedings, and reports. To ensure the quality and relevance of the selected studies, a manual screening process was conducted. This process involved excluding studies that were unrelated to the topic of student physical health or had incomplete bibliographic information, such as missing abstracts or data sets. Following this screening, a final total of 506 relevant studies were retained for further analysis. These studies were then exported in RefWorks format, which allowed for easy management and further processing of the data.

## Literature analysis method

The analysis of the collected literature was carried out using two distinct methods: visual analysis and network-based bibliometric analysis. The CNKI's built-in visualization tools were first used to generate an annual publication trend graph, which provided a preliminary understanding of the research output over time. This allowed for a basic temporal assessment of how student physical health research in China has evolved over the past three decades.

For a more in-depth exploration of the relationships between authors, institutions, and research themes, CiteSpace 6.2.R4 was employed. CiteSpace, a software developed by Professor Chaomei Chen, is widely recognized for its ability to conduct visual bibliometric analysis and to create knowledge maps that illustrate trends and connections within a given research field. In this study, the software was used to analyze co-authorship patterns, institutional collaboration, and keyword co-occurrence networks, which allowed for detailed visualization of the academic landscape surrounding student physical health research.

The time span for the analysis was set from 1992 to 2023, with a time slice of one year to capture yearly changes. The parameters were set as follows: g-index k = 10, which balances the number of connections and the quality of research, with default values used for other settings. This analysis provided a visual map of the key themes in the field, highlighting emerging research directions and identifying potential gaps in the literature. The results from this process were crucial in understanding the dynamic development of the field and helped pinpoint areas for future research.

## 3. RESULTS AND DISCUSSION

## Result

## Annual Distribution of Publications

The visualization of the annual distribution of publications is presented in Figure 1. The data reveals a general upward trend in the number of publications on student physical

health in China from 1992 to 2023, with some fluctuations in the volume of published studies. These fluctuations, as discussed by Gong et al. (2021), often reflect shifts in academic interest, funding availability, and changes in educational or health policies that influence the focus of research. The fluctuating trends also suggest that research priorities may have shifted in response to both emerging health concerns and evolving educational agendas.

Based on the publication trends, the research period can be divided into three distinct phases:

1992–2000: The early phase of research on student physical health was characterized by relatively low publication output, with only 34 papers published (approximately 4% of the total). This period likely marks the beginning of academic interest in the topic, reflecting its status as an emerging field of study. The limited number of publications during this time can also be attributed to the relatively low focus on physical education and health in the national curriculum and education policies.

2001–2008: This period saw a significant increase in the volume of research, with 254 articles published, representing 30.3% of the total publications. The introduction of the "Physical Education and Health Curriculum Standards" in 2001 played a pivotal role in this growth, as it placed a stronger emphasis on student health and physical fitness in the educational system. This policy shift led to an increased interest in researching the physical health of students, particularly in terms of physical fitness, health behaviour, and academic performance. The surge in publications during this period reflects the growing recognition of physical health as a crucial component of student development.

2009–2023: In this final phase, the number of publications remained high, with 557 studies published, accounting for 66.7% of the total research output. However, despite this dominance, there was a noticeable fluctuation and a gradual decline in the volume of publications after 2009. Several factors may account for this decline, including the stabilization of student fitness levels, as well as a potential shift in research focus toward other emerging health issues, such as mental health, nutrition, and the impact of technology on physical activity. This period also witnessed increased attention to global health challenges, including the rise of non-communicable diseases and their implications for youth populations.

The overall trend of increased publications, followed by a slight decline, indicates that while student physical health continues to be a significant area of academic interest, the focus of research may be evolving to include other factors influencing the health and well-being of students, both in China and globally. This shift in research focus may also reflect the broader societal and educational changes, including increased access to digital learning tools and the growing importance of mental health and emotional well-being in the context of student development.



Figure 1. Distribution of research papers on students ' physical health in China from 1992 to 2022

## Authors ' Publications

To examine the authors' contributions to the field, the "Author" option in CiteSpace was selected, and the resulting author map was analyzed. The number of articles published by a single author can reflect the depth of their research on students' physical health. In the author map, the size of an author's name corresponds to the volume of their publications, with larger names indicating a higher number of published works. The five authors with the highest number of publications are listed in Table 1, which highlights their contributions to the field. The data shows that Zhu Yongli (7 publications) and Zhang Qiangfeng (7 publications) are the most prolific authors in the research on students' physical health, followed by Sun Hongtao (5 publications), Liu Shengjie (3 publications), and Fu Jiliang (3 publications).

Table 1 The top five authors of Chinese students ' physical health research from 1992 to

No	Number of articles	Authors
1	7	朱永莉 (Zhu Yongli)
2	7	张强峰 (Zhang Qiangfeng)
3	5	孙洪涛 (Sun Hongtao)
4	3	刘生杰 (Liu Shengjie)
5	3	傅纪良 (Fu Jiliang)

2022

Based on the author's collaboration network map (Figure 2), there are 222 nodes and 73 connections, yielding a density of 0.003. Each node represents an individual author, indicating that 222 researchers are engaged in the study of students' physical health. The connections between nodes indicate collaborations between authors, with darker lines indicating earlier cooperation. From the visual map, it is evident that two prominent research teams—represented by Zhu Yongli and Zhang Qiangfeng—have made significant contributions to the field. Notably, Zhu Yongli's work predates Zhang Qiangfeng's, and their research focuses on different aspects of students' physical health. Zhu Yongli's studies primarily focus on the physical health of minority students, particularly in Yunnan Province (Zhu et al., 2009; Zhu et al., 2009; Xia et al., 2008). In contrast, Zhang Qiangfeng's research mainly addresses the "National Student Physical Health Standard," including the evolution of the testing system, adjustments to test items, and the challenges in testing (Zhang et al., 2021; Luo et al., 2021; Gao et al., 2015).

While the majority of studies are conducted individually, there is an opportunity for more collaborative efforts in the field. Overall, the research output is substantial, but fostering further cooperation among researchers could lead to more comprehensive studies and a deeper understanding of the topic.



Figure 2. The author cooperation network map of Chinese students ' physical health research from 1992 to 2023

#### Organizations ' Publications

In the CiteSpace interface, the "Institution" option was selected to generate the institutional collaboration map (Figure 3). The map reveals a total of 255 nodes and 51 connections, with a density of 0.0016. This indicates that 255 institutions have engaged in research on students' physical health, although the number of collaborative links between institutions is relatively limited.

Among the institutions, the one with the highest number of publications is the College of Physical Education at Yunnan University, with 8 articles, followed by Beijing Sport University with 7 articles, and the College of Physical Education and Health at East China Normal University, which has contributed 4 articles. The most prominent cooperative research team is the Yunnan Sports Institute, followed by the team collaboration with the Shanghai Student Physical Health Monitoring Center.

However, it is noteworthy that most institutional collaborations are regional, with limited cross-regional cooperation. This indicates an opportunity for further strengthening collaborative efforts between institutions from different regions in future research, which could help expand the scope and depth of studies on students' physical health.



Figure 3. The network map of cooperation between Chinese student physical health research institutions from 1992 to 2023

#### Keyword Distribution

#### 1. Keyword Co-Occurrence Analysis

In the CiteSpace interface, the "Keyword" option was selected to generate a keyword cooccurrence map (Figure 4). The analysis reveals a total of 220 nodes and 506 connections, with a density of 0.021. In this graph, each node represents a keyword, and the font size of the node indicates the frequency with which the keyword appears. Additionally, the size of the node's circle represents the centrality of the keyword, with larger circles indicating greater centrality and influence. Keywords with a centrality greater than 0.1 are considered significant in the field.

The top five most frequent keywords identified in the analysis are: "physical health," "physical fitness," "student," "student physical fitness," and "health status." Other prominent keywords include "school physical education," "college students," "physical education," "health," and "sports activities" (Table 2). The frequency of these keywords reflects the main research trends and hotspots in this area.

By excluding keywords related to the initial search terms, the high-frequency keywords can be categorized into two primary themes: research objects and research content. The research objects primarily focus on students across different educational levels—elementary, middle, high school, and college students from various regions. The research content focuses on health status (Liu et al., 2023), school physical education (Wu & Ji, 2023), and sports activities (Yang et al., 2022). This classification helps confirm the validity and relevance of the data and content presented in this study.

## 23 | ASEAN Journal of Sport for Development and Peace, Volume 5 Issue 1, Jan 2025 Pages 16-28



Figure 4. Keywords co-occurrence map of Chinese students ' physical health research from 1992 to 2023

Table 2 High-frequency keyword table of Chinese students ' physical health research
literature from 1992 to 2022 (top 10)

No.	Keyword	Frequency	Centrality
1	Students	134	0.27
2	Physical Fitness	123	0.33
3	Physical Health	100	0.36
4	Health Status	34	0.12
5	College Students	33	0.08
6	Health	29	0.03
7	School Physical Education	24	0.1
8	Student Physical Fitness	20	0.13
9	Physical Education	17	0.06
10	Sports Activities	13	0.0

## 2. Keyword Clustering Analysis

Building upon the keyword co-occurrence map, a keyword clustering operation was performed using the likelihood ratio (LLR) algorithm to generate the clustering map. The clustering results indicated that the Q-value was 0.5611, which is greater than the threshold value of 0.3000, and the S-value was 0.8605, exceeding the threshold of 0.7000. These values indicate that the clustering effect was successful and the clustering process was robust.

From the map, it is evident that seven distinct clusters were formed, which are categorized as follows:

- 0 # students
- 1 # physical health
- 2 # analysis
- 3 # physical exercise
- 4 # college students
- 5 # students' physical fitness
- 6 # health status

The first two clusters, '0 # students' and '4 # college students,' are related to the research object, focusing on different student populations. The remaining clusters, namely '1 # physical health,' '2 # analysis,' '3 # physical exercise,' and '6 # health status,' are linked to the research content, encompassing various aspects of student physical health, such as exercise routines, physical fitness analysis, and overall health status.

This clustering analysis further validates that the literature retrieved is aligned with the research focus of this study, confirming its relevance to the physical health of students, particularly in the context of Chinese educational institutions.





## 3. Timeline Distribution

The timeline diagram of keywords illustrates the chronological sequence in which keywords emerged, reflecting the evolution of research topics over time. The timeline distribution of keywords is presented in Figure 6. Due to space limitations, only the first six keyword clustering timeline maps are shown. Each cluster is represented by a straight line, with nodes along the line indicating the research scope within that cluster.

By comparing the timelines of the different clusters, it is evident that the content and duration of research within each cluster vary. The most abundant research content appears

to have occurred both before and after 2005. Specifically, the timeline reveals that the six clusters were actively researched around 2005. Notably, the clusters labelled '#0 students' and '#1 physical health' show continuous research from their inception and have remained relevant up until 2023.

One cluster, '#0 students,' pertains to the research object, while the other, '#1 physical health,' represents the research content. These two clusters have consistently remained central to research efforts in the field, indicating their enduring status as research hotspots in the domain of student physical health. This long-term focus on both the research subject and its related content suggests a stable and ongoing interest in understanding and improving the physical health of students across various educational stages.



Figure 6. Time distribution map of keyword clustering of Chinese students ' physical health research from 1992 to 2023

#### 4. Keyword Burst Analysis

The results of the keyword burst analysis are depicted in Figure 7. From the map, it is evident that the keyword "health" has the highest burst value (7.62) and the longest period. It was first introduced in 1997 and continued to be a significant focus until 2008, spanning nearly ten years. This indicates the sustained interest in the concept of health over a considerable period.

Several other key terms such as "college students," "health standards," "adolescents," and "vital capacity" also experienced relatively long research durations, further emphasizing their significance in the context of student physical health. On the other hand, terms like "evaluation," "countermeasures," "height," and "student physique" appeared briefly and did not develop into enduring research trends.

More recent keywords such as "regression analysis" and "health promotion" emerged around 2020 and have shown consistent heat, indicating their rising importance. These keywords are likely to become central research hotspots in the future of student physical health research in China, highlighting new directions and methodologies in the field.



#### Top 20 Keywords with the Strongest Citation Bursts

Figure 7. 20 keywords in the study of students ' physical health in China from 1992 to 2023

#### Discussion

This bibliometric analysis offers a panoramic view of the evolution and current landscape of research on students' physical health in China over the past three decades. The findings reveal not only the increasing scholarly attention to the topic but also shifting priorities and emerging frontiers within the field.

#### 4.1. Evolution of Research Output: Phases and Policy Impact

The division of the research timeline into three distinct phases—initiation (1992–2000), growth (2001–2008), and maturity (2009–2023)—corresponds closely to major policy shifts and educational reforms in China. The significant growth in publications during the early 2000s reflects the impact of the 2001 "Physical Education and Health Curriculum Standards," which marked a turning point in the national prioritization of student health. This policy-driven research momentum is consistent with previous observations that educational reforms in China often catalyze academic output in related fields (Gao et al., 2015; Zhang et al., 2020).

However, the gradual decline in publication volume after 2009 suggests a possible saturation of traditional research topics or a reorientation toward broader health concerns, such as mental health or digital lifestyle impacts. This shift reflects a growing awareness that student health must be addressed holistically, beyond physical indicators alone.

#### 4.2. Scholarly Landscape: Fragmentation and Potential for Collaboration

The analysis of author and institutional networks reveals a fragmented research community with limited collaboration. Although prolific authors such as Zhu Yongli and Zhang Qiangfeng have led significant contributions in specific subdomains, the low density of the author (0.003) and institutional (0.0016) networks underscores the need for more integrative and cross-regional collaboration.

Encouraging inter-institutional cooperation, particularly between high-output universities such as Yunnan University and Beijing Sport University, could foster multi-site studies and diversified perspectives. This is particularly important for addressing regional disparities in student health and for implementing scalable policy solutions.

#### 4.3. Keyword Patterns and Research Hotspots

The high-frequency keywords—such as "physical fitness," "health status," and "school physical education"—highlight the dominant focus on assessing student health outcomes and analyzing the role of physical education in schools. These results align with China's increasing concern about declining youth fitness levels and the integration of physical health into the educational agenda.

The emergence of terms like "health promotion" and "regression analysis" in recent years indicates a methodological and conceptual shift toward evidence-based interventions and predictive analytics. These trends suggest a move from descriptive studies toward more analytical and evaluative research, pointing to a maturing discipline that seeks actionable insights.

Moreover, the clustering and timeline analyses confirm the persistence of core topics, especially those focused on the "student" demographic and general "physical health" indicators. Yet, the relatively short-lived burst of some keywords—such as "height" or "countermeasures"—suggests the presence of transient trends, possibly driven by media attention or temporary policy initiatives.

#### 4. CONCLUSION

In this study, 506 core journals from the China National Knowledge Infrastructure (CNKI) were used as the primary data for map visualization analysis, leading to several conclusions. First, the annual number of core journals in the field of student physical health research showed an increasing trend with slight fluctuations. This trend can be divided into three stages: the initial stage (1992-2000), characterized by a relatively low number of publications; the rapid growth stage (2001-2008), where research output saw a significant rise, possibly due to the introduction of the "Physical Education and Health Curriculum Standards"; and the stable development stage (2009-present), where publication volume stabilized but with some fluctuations reflecting shifts in research interests. Second, the analysis revealed that there are relatively few high-yield authors and institutions, with weak collaboration between authors and institutions. This suggests a trend of "large dispersion and small concentration," meaning that while many researchers contribute to the field, collaborative efforts remain limited. Third, the current situation and hotspots of student physical health research in China are centred around several key areas: research on the current state of students' physical health, the development and evaluation of health measurement standards for students, and methods to promote students' physical health, as well as the relationship between physical health, sports, and physical education.

Based on these findings, several suggestions can be made. It is essential to strengthen exchanges and collaboration within the field by establishing multiple scientific research centres. Beyond current intra-institutional cooperation, cross-regional collaboration should be encouraged to foster mutual learning and the sharing of best practices. Additionally, expanding research teams and updating the knowledge system is crucial. The study of

students' physical health should integrate multiple disciplines to form an interdisciplinary system, allowing for more comprehensive approaches to research. Researchers should refine the scope of their studies to account for different research objects, as varying populations may lead to different outcomes. Ultimately, achieving China's goal of becoming a sports power requires extending research efforts beyond students to encompass broader societal levels.

## 5. AUTHOR'S NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

## 6. **REFERENCES**

- Gao, L., Zhao, H., & Luo, M. (2015). On the adjustment of test items in the "National Student Physical Health Standard." *Continuing Medical Education*, *29*(1), 36–38.
- Gong, L., Gao, D., & Chen, X. (2021). Hotspots, trend and implications of global research on exercise prescription: an analysis based on CiteSpace V. *Journal of Beijing Sport University*, *44*(5), 21-33.
- Hua, K., Liu, X., Zhang, Q., et al. (2022). Adolescent physical exercise and academic performance: A re-examination based on CEPS data. *China Sport Science and Technology*, *58*(08), 103–108.
- Liu, Y., Shi, D., Zhong, P., et al. (2023). Physical health and gender differences of minority middle school students in China from 2010 to 2019. *Chinese School Health*, 44(1), 104–109.
- Luo, P., Li, Y., Zhang, Q., et al. (2021). The evolution, characteristics, and future prospects of China's student physical fitness testing system since the reform and opening up. *Journal of Wuhan Institute of Physical Education*, *55*(4), 88–93.
- Wu, B., & Ji, L. (2023). The influence of Chinese healthy physical education curriculum model on college students' physical education learning effect. *Journal of Physical Education*, *30*(3), 106–112.
- Xia, W., Zhu, Y., Duan, L., et al. (2008). A review of research on the physical health of ethnic minority students. *Ideological Front*, *34*(S4), 156–158.
- Yang, M., Lou, X., Xu, X., et al. (2022). Current status of physical exercise among primary and secondary school students in Henan and its relationship with physical fitness and BMI. Chinese School Health, 43(10), 1492–1494, 1499.
- Zhang, Q., Zhou, F., Liu, Z., et al. (2020). Disclosure of "National Student Physical Health Standard" test results: Motivations, problems, and strategies. *Journal of Wuhan Institute* of Physical Education, 54(9), 10–15.
- Zhang, Q., Zhang, Y., Yan, L., et al. (2021). Dilemmas and solutions in the public disclosure of the "National Student Physical Health Standard" test results. *Journal of Physical Education*, 28(1), 114–119.
- Zhu, Y., Duan, L., Xia, W., et al. (2009). Static analysis of physical fitness test results of university students from six ethnic minorities in Yunnan Province. *Journal of Yunnan* University (Natural Sciences), 31(S1), 406–410.