

College Sport Publication Trends Over 15 Decades: A Bibliometric Analysis

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ABSTRAK

Sekolah tinggi olahraga memiliki dampak yang signifikan terhadap perkembangan olahraga. Penelitian ini bertujuan untuk memberikan elaborasi yang komprehensif dengan menggambarkan parameter deskriptif publikasi, memvisualisasikan pola kutipan, mengekstraksi kata kunci penulis, dan menentukan dampak dan kinerja penelitian pada sekolah tinggi olahraga. Kajian ini mencakup orientasi bagi peneliti untuk lebih memahami kemajuan publikasi ilmiah terkait olahraga di sekolah tinggi. Data diperoleh dari database Scopus yang berjumlah 947 dokumen dari tahun 1869 hingga 2022. Penelitian ini menemukan jumlah publikasi berfluktuasi, dengan 2021 memiliki jumlah publikasi tertinggi. Di antara 49 negara yang ada, ilmuwan dari China menyumbang sekitar 325 dari total publikasi internasional. Selain itu, dengan total 55 dokumen, *Journal of Medicine and Science in Sports and Exercise* merupakan salah satu sumber ilmiah paling produktif. Secara keseluruhan, dapat dikatakan bahwa penelitian tentang topik ini berkembang, dengan metode dan arah baru yang ditetapkan. Akibatnya, pemeriksaan mendalam tentang olahraga sekolah tinggi di berbagai bidang penelitian dapat membantu peneliti dan praktisi memajukan pengetahuan prospektif di bidang ini

Kata kunci: Bibliometrika; tren publikasi; sekolah tinggi olahraga; VOSviewer

ABSTRACT

College sports have a significant impact on sport development. This study aims to provide a comprehensive elaboration by describing the publication's descriptive parameters, visualizing the citation pattern, extracting the author's keywords, and determining the impact and performance of research on college sports. This study includes an orientation for researchers to better understand advances in collegiate sports-related scientific publications. A thorough examination of the 947 documents found in the Scopus database was conducted from 1869 to 2022. According to the findings, the number of publications fluctuated, with 2021 having the highest number of publications. Among the 49 other countries, scholars from China accounted for approximately 325 of total global publications. Furthermore, with a total of 55 documents, the *Journal of Medicine and Science in Sports and Exercise* is one of the most productive scientific sources. Overall, this topic's research is evolving, with new methods and directions being established. As a result, an in-depth examination of collegiate sports in a variety of research areas can help researchers and practitioners advance prospective knowledge in these fields.

Keywords: Bibliometric; publication trends; college sports; VOSviewer



1. INTRODUCTION

Sport is very important in today's society (Loland & McNamee, 2016). Similarly, collegiate sports play an important role in the growth of amateur and professional sports. Collegiate sports have progressed from colonial intramural activities aimed at maintaining physical fitness to a multibillion-dollar intercollegiate enterprise (Kn. Comm. Intercoll. Athl., 2009; Vanover & DeBowes, 2013). The evolution resulted in differences in the philosophy and initial goals of collegiate sports that were built and implemented. Sports are played for enjoyment, not for monetary gain, and this is the foundation upon which the intercollegiate sports regulation system is built (Walker & Santayana, 1894). As a result of widely publicized scandals involving student-athletes and coaches, as well as the increasing number of resources schools must invest to remain competitive in the intercollegiate athletic environment, the debate has become highly contentious (Pope & Pope, 2009). The size of intercollegiate athletics' economic impact in universities is a hotly debated topic among researchers, university decision-makers, and politicians (Humphreys, 2006).

Sport in college is a logical extension of the youth sports education process in the educational system (Popeska et al., 2015). Sport, in addition to being a sports education process for youth, must also be enjoyed by all. College sports are important sources of spectator sports (Inoue et al., 2019). The public's interest in collegiate athletics will continue to grow, and this is a necessary step in adapting to the growing popularity of collegiate sports (Thacker, 2017). Furthermore, college sports, which are currently developing, are a part of the sports industry (Inoue et al., 2019).

From the athlete's point of view, it is said that college athletes have a special appeal to sports fans, talent scouts, and professional clubs. The National Collegiate Athletic Association (NCAA), is the most popular student basketball league in the United States. College athletes are lauded as local and national celebrities in the United States, and they are recognized on their college campuses (Clotfelter, 2011; Duderstadt, 2003). While some college athletes are drafted into professional leagues and have long and successful careers, the NCAA reports that 98 percent of all college athletes will not have careers outside of sports (Menke & Germany, 2018). A "big win" can energize a campus, energize students, and inspire its constituents (Clopton, 2008).

Bibliometric reviews are used in sports across a variety of subdomains including; sporting event volunteers (Ahmad et al., 2021); exercise and outdoor air quality used for exercise (Andrade et al., 2017); sport and technology (Belfiore et al., 2020); exercise and motivation (Clancy et al., 2017); exercise and caffeine (Contreras-Barraza et al., 2021); exercise and exercise medicine (Fares et al., 2017); sports innovation (Ferreira et al., 2020); leadership in sports (Gan & Yosuf, 2020); sports and physical education (Gümüs et al., 2020); sports marketing (Karafil & Akgul, 2021); ITF training and sports science (Knudson, 2020); sport and psychology (Lindahl et al., 2015); sport and social media (López-Carril et al., 2020); olympic sports science (Millet et al., 2021); sport and economy (Santos & Garcia, 2012); sport and education (Završnik et al., 2015).

However, one significant limitation is the scarcity of bibliometric reviews of college sports. As a result, this study was started to fill a gap in sports publication trends in universities in sports research. This bibliometric study is an objective and trustworthy resource that provides a mapping of research areas, allowing for a broader range of selected studies (Hernández-Torrano et al., 2020). The authors are particularly interested in aspects of research related to sports college in this bibliometric review, to (1) describe the descriptive parameters of

publications such as publication evolution, prominent sources, influential countries and institutions, and active authors; (2) visualizing citation patterns from academic works in sports college; (3) extracting keywords and creating maps that describe the occurrence of the term together in academic works in sports college; and (4) understanding the impact and performance of scientific research in sports college. This research helps academics interested in sports college, policymakers create more sports college development, and individuals consider research patterns in sport college activities to identify potential future research opportunities.

2. METHODS

Accuracy in database selection in a bibliometric study is undoubtedly one of the factors used to assess the quality and substance of a research study. Scopus databases relevant to this bibliometric research topic were chosen, taken, and used as the primary source of information to investigate the topic under consideration. Scopus was chosen for this study because it has several advantages over other databases such as Web of Science, Medline, and Google Scholar (Bakkalbasi et al., 2006; De Groote & Raszewski, 2012; Kulkarni et al., 2009), and PubMed (Abdullah, 2021; Falagas et al., 2008). Scopus can perform a variety of analytical functions (Sweileh et al., 2017). One such function is "source type," which allows us to filter the retrieved literature by data source types, such as journal publication, book, book chapter, conference proceedings, or trade publication. Furthermore, Scopus has functions that aid in the sorting and ranking of countries, authors, journals, and institutions. The number of citations for each set of documents, as well as the Hirsh index (h-index), was used to assess the scientific impact (Hirsch, 2005). Articles indexed on Scopus must have an English abstract; thus, regardless of the original language of the document, the relevance of any retrieved document can be confirmed by reading the English abstract (Sweileh, 2018). In bibliometric analysis, the total amount of metadata that must be met in order to be studied varies substantially. The number of metadata numbers that can be used for bibliometric analysis, as well as the minimum and maximum metadata standards that can be evaluated, are not stated (Sofyan, 2022).

Keyword design is an important factor that cannot be overlooked in order to find various documents that have a correlation with the topic of the research study. We downloaded the dataset on March 10, 2022. The keyword terms used in this study are "sport *college*" OR "sport" AND "college." It was discovered that there were 947 documents related to sports related bibliography in universities. The documents were obtained by using the following methods: 1) Scopus exported a refine value (CSV file format), which will be used for manual analysis after being exported into excel file form; 2) export a comma separated value (CSV) file, which will be analyzed using VOSviewer after the double file yellowness has been removed. The strategy for deleting duplicate data is discussed further in the following sub-chapter.

The 947 Scopus metadata was extracted and saved as a CSV file, then manually analyzed in excel format to look for the possibility of duplicate documents from the researcher. Researchers analyze the possibility of duplicate documents by doing the following: 1) Select all titles in the title column, 2) Select the conditional formatting menu, 3) Highlight cell rules, and 4) Finally, select the duplicate values sub-menu. After this procedure is completed, a new document will be created. We can see that the document is red, which indicates that it has a double possibility or even multiple copies of the same document. To make the process of analyzing these multiple documents easier, the researcher sorted and filtered them so that they could be ordered in an orderly fashion. To ensure that the document is not duplicated, it also

checked the link and DOI, which will direct to the scientific source of the document. Following that, the study also read and compare the titles and abstracts listed on the scientific sources' web pages. It was discovered and determined as many as 13 multiple documents as a result of our analysis, with the following details: 1) one document in 2011, one document in 2013; 2) two documents in 2001, 2007, 2014, and 2015; and 3) three documents in 2016. As a result, the total number of documents to be analyzed with VOSviewer is 934.

Bibliometric indicators and mapping

It presents a number of bibliometric indicators that can be analyzed and discussed further. The bibliometric indicators include global publication trends, citation analysis, the top 10 document citation analysis cited, the top 10 most active journals, the top 19 active countries, the most productive institutions/organizations/institutions, the most productive authors, the most influential authors based on the number of citations and their H-impact using Publish or Perish, a keyword term commonly used by researchers, and the top 10 document citation analysis cited. Except for VOSviewer, which uses CSV format, all data is exported from Scopus to Microsoft Excel for data analysis and presentation. The authors of this review acknowledge and caution about probable similarities in the names of the document's authors, which is one of the bibliometric studies' weaknesses (Sofyan & Abdullah, 2022).

VOSviewer

VOSviewer is a free program that allows you to create maps that display bibliometric network data (Wong, 2018). VOSviewer is a piece of software that allows you to create and view graphic and bibliometric maps (Akinlolu et al., 2020). VOSviewer is a keyword processing and clustering analysis software used for network map visualization using chance matrices, which allows clustering based on co-authoring and co-occurrence (van Eck & Waltman, 2010). VOSviewer is a popular tool for displaying maps of global scientific collaboration (Velasco-Muñoz et al., 2018). VOSviewer software (version 1.6.11, 2019, Leiden University, Leiden, Netherlands) was used for visual analysis, network mapping of co-occurrence keyword diagrams, and visualization of co-authored author, country, and organization networks. The full-count method is used for network maps, which means that each co-occurring link has the same weight. For normalization of the occurrence matrix, the default "association strength method" is used, along with the default values of attraction and repulsion (Yuan & Sun, 2020). The VOSviewer Software employs fractional counting (keywords per paper-keyword count is unaffected by author count) (Merigó et al., 2019).

3. RESULTS AND FINDINGS ANALYSIS

From 1869 to 2022, the Scopus database contained 947 publications related to sports (as of 22 February 2022) as seen in Table 1.

Table 1. Type of document, language and stage of publication

Document type	Record count	%	Language	Record count	%
Article	540	57.02	English	887	92.27
Conference Paper	222	23.44	Chinese	21	2.19
Review	56	5.91	French	9	0.93
Note	32	3.37	German	9	0.93
Book Chapter	31	3.27	Spanish	7	0.73
Letter	20	2.11	Japanese	6	0.62
Book	10	1.05	Portuguese	6	0.62

Erratum	10	1.05	Russian	5	0.52
Short Survey	10	1.05	Dutch	2	0.21
Editorial	9	0.95	Croatian	1	0.11
Retracted	7	0.73	Danish	1	0.11
			Italian	1	0.11
			Korean	1	0.11
			Polish	1	0.11
			Catalan	1	0.11

For more information, as of 22 February 2022, 937 (98.94 percent) documents had been finalized for publication and 10 (1.06 percent) documents were in the article in the press stage.

Trends in publication

It is found that "The Lancet," Volume 93 (2389), pages 829–830, published the first article on college sports in 1869 entitled "University College Athletic Sports." Because no duplicate metadata was found in 2021, the highest number of publications was achieved with a total of 114 (12.20 %) documents. From 15 countries involved in publishing 409 (43.79 %) documents, it showed the growth of publications from the Asian region as seen in Figure 1.

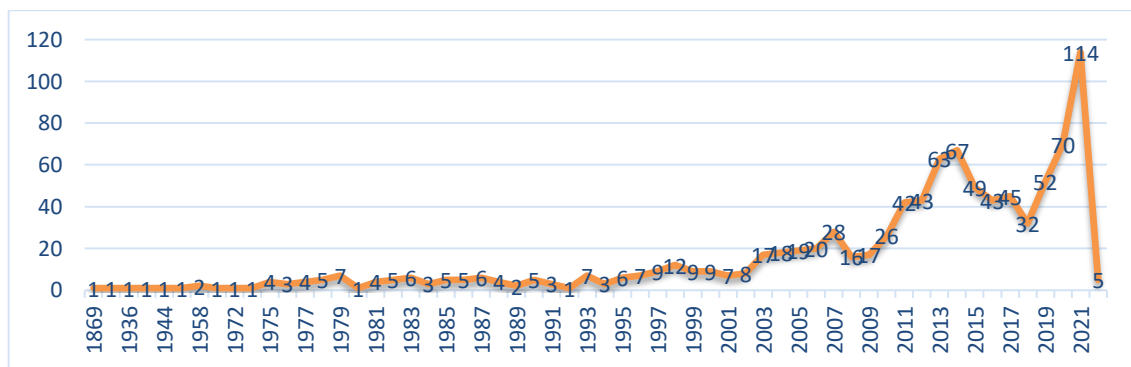


Figure 1. Depicts trends in university sports publications from 1869 to 22 February 2022

The density of publications by country

Figure 2 depicts the geographical distribution of the authors who contributed to the retrieved document on a world map. The map depicts 49 different countries. With 325 documents, China is the most productive country. The United States and the United Kingdom came in second and third, with 305 and 31 documents, respectively. Meanwhile, South Africa is the most active country in the African Region, with 3 documents.

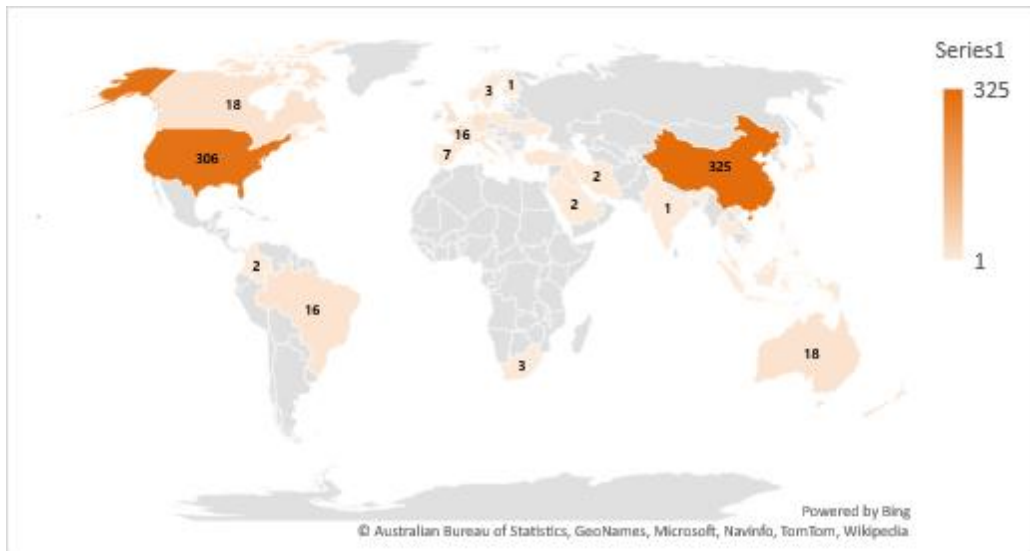


Figure 2. Depicts the distribution of country density in university sports publications

The top ten most active institutions

This review also considered institutional involvement in sport in universities, based on at least ten institutions out of 160 institutions with at least two documents. Researchers from a variety of academic institutions contributed to the publication of the selected articles. The University of Pennsylvania, The University of North Carolina at Chapel Hill, and The University of Minnesota Twin Cities, all from the United States, are the most prolific in this area, with a combined total of 10 (1.07 %) published documents, followed by Florida State University, also from the United States, with a total of 9 (0.96 %) published documents. Table 2 lists the ten most active institutions/organizations.

Table 2. The top ten most active institutions

Affiliation	Country	Document (n = 934)	%
Pennsylvania State University	United States	10	1.07
The University of North Carolina at Chapel Hill	United States	10	1.07
University of Minnesota Twin Cities	United States	10	1.07
Florida State University	United States	9	0.96
Indiana University Bloomington	United States	9	0.96
The University of Texas at Austin	United States	8	0.85
University of Florida	United States	7	0.74
University of Washington	United States	7	0.74
Texas A&M University	United States	7	0.74
Centers for Disease Control and Prevention	United States	7	0.74

The five active authors

From 1869 to 2022, 1,807 authors wrote a total of 934 Scopus documents on collegiate sports. Academic advances in digital technology have simplified the creation of inventions. As a result, this study looked into the authors by conducting a review of the most active authors. Table 3 shows the authors who contributed the most to the literature based on the number of publications. Suggs, W., with 15 publications (1.60 percent) and citations, is the author with the most publications (1525). Table 3 lists additional authors.

Table 3. The top five most active authors

Author	Country	Document	Affiliation
Suggs, W.	United States	15	University of Georgia
Thompson, P.D.	United States	7	Brown University
Blair, S.N.	United States	6	Arnold School of Public Health
Roberts, W.O.	United States	5	University of Minnesota
Roy, B.A.	United States	5	University of Oregon

The most popular journal

The most prominent scientific sources in the field of college sports are seen in Table 4. According to the table, publications in the field of college sports have not been able to compete with other fields or scientific studies because few researchers publish their articles in leading journals/procedures. Journal of Medicine and Science in Sports and Exercise (55 documents), Chronicle of Higher Education (3 documents), Journal of Physics Conference Series (55 documents), Journal of Physics Conference Series (55 documents), Journal of Physics Conference Series (55 documents), Journal of Physics Conference Series (55 documents), Journal (24).

Table 4. The most fruitful scientific sources

Source	Document	Publisher
Medicine and Science in Sports and Exercise	55	American College of Sports Medicine
Chronicle of Higher Education	33	The Chronicle of Higher Education Inc
Journal of Physics Conference Series	24	IOP Publishing
ACM International Conference Proceeding Series	23	Association for Computing Machinery
British Journal of Sports Medicine	15	BMJ Group
Lecture Notes in Electrical Engineering	15	Springer Verlag
Economist United Kingdom	13	The Economist
Advanced Materials Research	11	Trans Tech Publications
Advances in Intelligent and Soft Computing	11	Springer Nature
Recreational Sports Journal	11	Sage Publishing Inc.

Top-cited articles

With a total of 6430 citations, W.L. Haskell et al. (2007) received the most citations in their article titled "Physical activity and public health: Updated recommendation for adults from the American College of Sports Medicine and the American Heart Association." The study "Physical Activity and Public Health: A Recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine," written by RR Pate et al., (1995), has received the most citations, with a total of 5776. With a total of 2953 citations, the study "Physical activity and public health in older adults: Recommendation from the American College of Sports Medicine and the American Heart Association" written by ME Nelson, et al., (2007) is the third most cited publication. These three publications can be used by a researcher in the future to conduct research. Table 5 shows references to other articles.

Table 5. The top ten citations

Citation	Author	Title	Year
6430	W.L. Haskell, et al.	Physical activity and public health: Updated recommendation for adults from the American College of Sports Medicine and the American Heart Association	2007
5776	R.R. Pate, et al.	Physical Activity and Public Health: A Recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine	1995
2953	M.E. Nelson, et al.	Physical activity and public health in older adults: Recommendation from the American College of Sports Medicine and the American Heart Association	2007
1784	K.H. Schmitz, et al.	American college of sports medicine roundtable on exercise guidelines for cancer survivors	2010
823	S.R. Colberg, et al.	Exercise and type 2 diabetes: The American College of Sports Medicine and the American Diabetes Association: Joint position statement	2010
552	R. Meeusen, et al.	Prevention, diagnosis, and treatment of the overtraining syndrome: Joint consensus statement of the european college of sport science and the American College of Sports Medicine	2013
509	S.P. van Camp, et al.	Nontraumatic sports death in high school and college athletes	1995
475	D.T. Thomas, et al.	Position of the Academy of Nutrition and Dietetics, Dietitians of Canada, and the American College of Sports Medicine: Nutrition and Athletic Performance	2016
438	S.R. Colberg, et al.	Exercise and type 2 diabetes: The American College of Sports Medicine and The American Diabetes Association: Joint position statement executive summary	2010
418	N.R. Rodriguez, et al.	Position of the American Dietetic Association, Dietitians of Canada, and the American College of Sports Medicine: Nutrition and athletic performance.	2009

The most frequently discovered terms

There were 240 keywords found out of a total of 1630, with a minimum of two keywords appearing twice. However, we suspect that several terms are similar to indicators: 1) the term has a single plural meaning, such as "sport" and "sports"; 2) have the same meaning, such as "sport" and "athletics." So, after performing a manual analysis on these 240 keywords in MS Excel using "replace by," we discovered the results of 14 thesaurus terms.

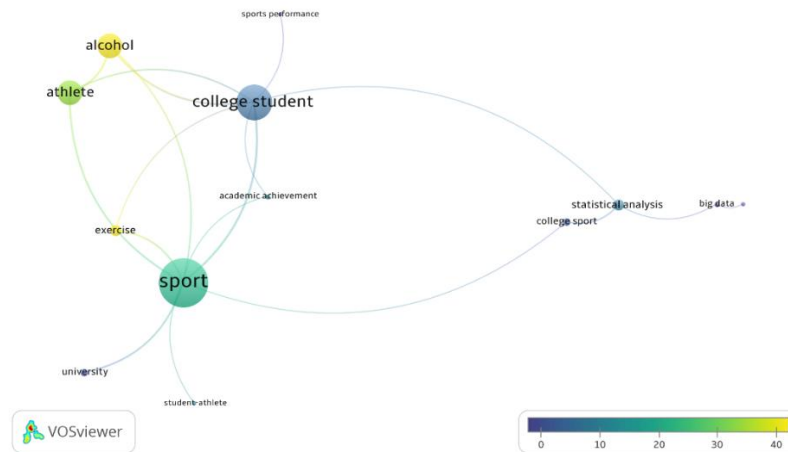


Figure 3. Terms that appear frequently in college sports publications

The international collaboration of countries is active in college sports publications

International cooperation between countries is being actively pursued. The bibliometric analysis included 19 countries (out of 49) with at least 5 published documents, and each country had at least one document cited. Figure 4 depicts the visualization map. France, Germany, Italy, the Netherlands, Spain, and Switzerland (indicated by red dots) are in the first cluster; China, Singapore, South Korea, and Taiwan (indicated by green dots) are in the second cluster; Australia and New Zealand (indicated by blue dots) are in the third cluster; Canada and Japan (indicated by yellow dots) are in the fourth cluster, and Turkey and the United States (indicated by purple dots) are in the fifth cluster (shown by the blue dot) are in the sixth cluster.

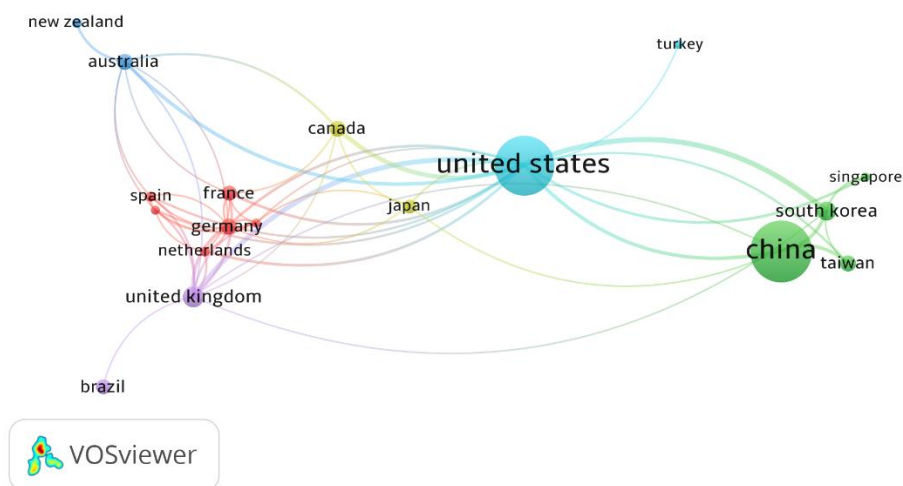


Figure 4. Depicts a map of the international cooperation networks between active countries

4. DISCUSSION

It discovered significant findings in this manuscript, which corresponds to the increasing number of research developments and publications related to collegiate sports in an academic context in recent years. However, there are few bibliometric study titles dealing with collegiate sports in the literature. We discovered a bibliometric study in the literature (Wang & Zhou, 2021) with the title "Hot topics and trends in sports research related to college students: a bibliometric systematic review" and the document-type conference paper.

According to the publications in this field, China is the most contributing country, followed by the United States and the United Kingdom. In collegiate sports research, it was discovered that not only developed countries, but also developing countries such as Brazil, Iraq, and South Africa made significant contributions to the literature.

W.L. Haskell et al., (1995) published an article titled "*Physical activity and public health: Updated recommendations for adults from the American College of Sports Medicine and the American Heart Association*" in the journal "*The Journal of the American Medical Association*" with the publisher American Medical Association, United States. The study discovered that "*Medicine and Science in Sports and Exercise*," published by the American College of Sports Medicine, was the most contributing journal in the field of collegiate sports. By the number of publications, Pennsylvania State University was the most contributing university, followed by The University of North Carolina. According to a co-citation analysis of active authors with a total of 6430 citations, the top author cited in this study is W.L. Haskell, et al., (1995).

The most recent keywords are "college sports" and "big data." This demonstrates that college sports and big data are important concepts in the development of college sports research. Furthermore, future research must use these keywords as a foundation for discovering new concepts in college sports research. Figure 5 depicts the most recent publications using keywords that are close to yellow.

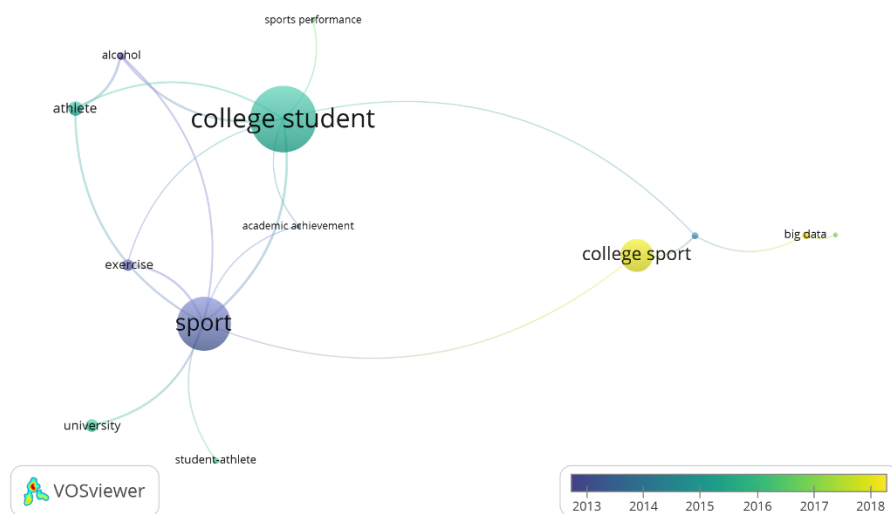


Figure 5. Map of a new keyword term visualization

This study identified the main themes or keywords associated with sports in college. As a result, based on the growth trends of publications and the authors' keywords, this bibliometric analysis can generate proposals for future research. These elements are required for future researchers to outline the background or address broad issues raised by previous college sports research. Other review methodologies, such as narrative review, scoping review, systematic literature review, or meta-analysis, may also be used to describe the relationships discovered in the study.

More research should be done to determine the trend of sports publications in universities in terms of interventions in specific target groups. As a result, progressive college sports are frequently an important aspect of college sustainability in terms of promoting and developing knowledge and skills, as well as serving as a vehicle for institution promotion. As a result of

these bibliometric findings, readers, educators, and researchers will be able to better identify important information in their future studies to assess the value of vocational education.

5. CONCLUSION

As new trends emerge, this bibliometric review encourages the examination and integration of established directions in sports research in higher education. The researcher discovered that the information below provides readers, education practitioners, sports practitioners, and researchers with a more tangible reality based on a bibliometric review of 153 years of college sports research.

Indeed, bibliometric studies can project or provide insight into the state of the art in a specific field or subject. Aside from the useful information provided by this paper, some limitations should be highlighted to assist future readers and researchers in better understanding. This study relies solely on documents from the Scopus database as its primary source. Dimensions, Microsoft Academic, Web of Science (WoS), and Google Scholar are four other databases that may be useful for bibliometric analysis. In addition, prospective researchers will use other software programs such as the R package, BibExcel, CiteSpace, and SciMAT to visualize large amounts of data in a variety of situations.

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