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SPORT PARTICIPATION IN SCHOOLS: A BIBLIOMETRIC STUDY OF TRENDS AND RESEARCH FOCUS

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Abstract. Research on sport participation in schools has undergone dynamic development. This study explores the trends and advancements in student sport participation using a bibliometric analysis approach. A total of 2,342 articles published between 2014 and 2024 were analyzed to uncover the evolution, focus areas, and key contributions within this field. Drawing on data from the Scopus database, the bibliometric analysis investigates scientific publications related to sport participation in educational contexts. The use of VOSviewer software enabled the visualization of collaboration networks among researchers, institutions, and research topics, offering deeper insights into the structure and dynamics of the research landscape. This method provides an overview of trends over time, identifies prominent themes, and highlights the contributions of leading institutions and scholars. The study emphasizes the significance of continuous research and collaborative efforts in advancing sport participation in schools. Furthermore, a systematic literature review was conducted to identify potential research directions, offering comprehensive guidance for future studies in the field.

Keywords: Sport Participation, Bibliometric Analysis, School, Physical Education, Research Trends, Research Focus

I. INTRODUCTION

Sports participation in schools is important to discuss, as it offers wide-ranging benefits, contributing to students physical, mental and social well-being. (Bang et al., 2020). There are numerous opportunities within sports for children and adolescents to cultivate personal and interpersonal skills, contributing to their overall well-being (Bedard et al., 2019). Since sports consistently attract and engage young children in environments that are not only challenging but also typically safe, structured, and well-supervised, they appear to offer conducive settings for interventions and fostering positive change (Bean & Forneris, 2016). Sport can also encourage a healthier lifestyle and reduce the risk of obesity (Gao et al., 2022), cardiovascular diseases (Absil et al., 2019), and diabetes (Dimitri et al., 2020), which are increasing concerns among children and adolescents. Moreover, physical activities in schools encourages students to adopt lifelong fitness habits, positively influencing their well-being into adulthood (Boonekamp et al., 2021). In addition to the physical benefits, sports has a major impact

on mental health by reducing stress, anxiety and depression, which are increasingly found among children and adolescents (Guddal et al., 2019).

Studies reported that engaging and participating in sports offers various psychosocial benefits (Apriady, Robandi, et al., 2024; Emmonds et al., 2024). It has been shown that sport can enhance emotional resilience by facilitating the development of stress management strategies and self-esteem, especially in academically or socially challenging environments. (Alberga et al., 2012; Dunston et al., 2020). By participating in sports can increase feelings of physical competence, satisfaction with body image and physical appearance, which can lead to increased self-esteem. (Gomez-Baya et al., 2019). And through sports participation, students also learn to develop social skills such as teamwork, effective communication, and respect for others, which are vital to their social development (Opstoel et al., 2020). Participation in sport provides exposure to both positive and negative experiences associated with physical activity and social relationships. Although sport has the potential to be a preventive aspect, certain aspects of sport can produce

detrimental effects in the physical, psychological, emotional, and social domains. (Panza et al., 2020). For instance, the mental well-being of adolescent athletes can be affected by insufficient experiences (such as hindered autonomy) or even abusive relationships with coaches, parents, peers, and other individuals involved in sports. (Evans et al., 2012). Despite numerous studies supporting the benefits of sports participation for students in schools, research analyzing the development of literature and global research trends on this topic remains limited (Aubert et al., 2021).

Bibliometric analysis has been shown to be an effective method for identifying recurring keywords and tracking the development of ideas over time, as well as predicting future trends (Donthu et al., 2021). The main focus of this study is to conduct a bibliometric analysis of research related to school sports participation and associated topics between 2014 and 2024. This study focuses on four objectives. First, the identified publication trends reveal the current development and maturity of research on school sports participation, helping future researchers assess how well their intended studies align with the field's trajectory. Second, by identifying the most influential papers, authors, and frequently used keywords, this study allows future researchers to recognize key contributors and foundational concepts that can guide the coherent growth of this research area. Third, the cluster analysis conducted highlights the extent of current knowledge and suggests future research directions related to school sports participation. Finally, by identifying the most active countries in this field, this research reveals opportunities for international collaboration. Such collaboration can promote the exchange of knowledge and adaptation of practices across regions, ultimately advancing student engagement and well-being through effective school sports programs.

II. METHODS

We initiated our investigation by employing bibliometric analysis to compile a comprehensive collection of literature on school-based sports participation. Bibliometric analysis functions as an essential tool for mapping vast bodies of scholarly literature, similar to systematic literature reviews, by ensuring the reliability and precision of the information employed and the results generated (González-Torres et al., 2020). By employing this approach, researchers can develop a thorough understanding of the knowledge landscape within the specific domain, while also uncovering trends, patterns, and interconnections among existing studies (Li & Wang, 2022). Bibliometric analysis facilitates the exploration of collaboration networks among authors, countries, and research topics, thereby uncovering the underlying relationships between these entities (Chen et al., 2023). For our bibliometric analysis focused on sport participation in schools, we selected Elsevier's Scopus database as the primary source for bibliographic research on this topic. This study entailed a comprehensive background analysis encompassing approximately 2,342 articles published over a span of more than 10 years, from 2014 to 2024. Our exploration of the Scopus database on October 16, 2024

aimed to gather journals and articles. In a bibliographic repository covering more than 2,000 multidisciplinary subjects, we carried out a bibliometric analysis focused on visualization techniques for representing similarity. Using a science mapping approach, we explored the existing body of literature by analyzing bibliographic data extracted from a diverse range of documents within the field (Donthu et al., 2021).

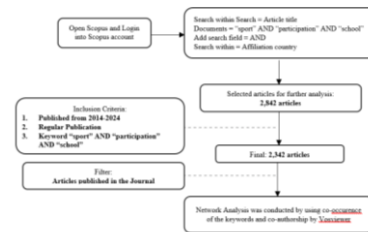


Fig. 1. Document Article Filtering Process in Scopus

To improve the relevance of our data, we refined our search to specifically target the topic of sports participation in school, extracting pertinent information such as citations, bibliographic details, abstracts, keywords, findings, and other related content. We utilized keywords such as “Sport Participation” and “School Student”, applying filters aligned with practices of sport participation in school. Our search focused exclusively on article titles to ensure the inclusion of directly relevant reports, as broader searches may overlook explicitly related studies. The specific keywords used in our search are outlined below.

TITLE-ABS-KEY (sport AND participation AND school) AND PUBYEAR > 2013 AND PUBYEAR < 2025 AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (LANGUAGE , "English"))

III. RESULTS

1) Document Published

From 2014 to 2024, researchers from 119 countries have articles related to sports participation in school. The overall publication trend in sport participation in school from 2014 to 2024 is depicted in Figure 2. Analysis based on the Scopus database shows that in 2014, there were 168 published articles. In 2015 the number of articles published decreased to 127. In 2016 the number of published articles rose again to 179. However, in 2017 there was a slight decrease in publications with the number of articles being 174. In the following two years, 2018 and 2019, a notable increase in the number of publications, with 191 articles published in 2018 and 227 in 2019. In 2020 and 2021, the number of published articles continued to increase, reaching 240 and 278, respectively. Over the next three years, the number of publications steadily declined, with totals of 255, 265, and 238 articles. The declining number of publications on research related to Sport Participation in Schools necessitates an investigation into the underlying causes.

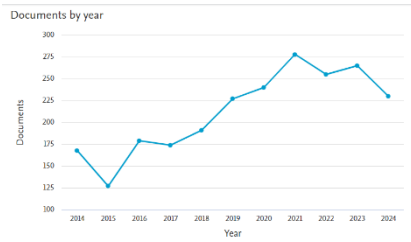


Fig. 2. Document Published on Scopus Databased

In Table 1, the top 10 authors with the most influential articles in research on Sport Participation in School are listed. The first position is held by the article published by Mez et al., with a total of 758 citations. The second position is occupied by the article published by Sanders et al., with 733 citations. McMahon et al., article ranks third, with a total of 400 citations. In fourth and fifth place are occupied by Tremblay et al., with different article titles. Meanwhile, articles by Telford, Milewski, and Deforche have total citations less than 300, in descending order. This table highlights the most influential articles and their citation counts in the field of Sport Participation in School, offering insights into the significant research contributions of various authors.

Table 1. Top 10 articles with the most citations on Scopus

Rank	Document Title	Authors and Year	Citation Total
1.	Clinicopathological Evaluation of Chronic Traumatic Encephalopathy in Players of American Football	(Mez et al., 2017)	758
2.	Incidence of Anterior Cruciate Ligament Tears and Reconstruction	(Sanders et al., 2016)	733
3.	Physical activity in European adolescents and associations with anxiety, depression and well-being	(McMahon et al., 2017)	400
4.	Global Matrix 2.0: Report Card Grades on the Physical Activity of Children and Youth Comparing 38 Countries	(Tremblay et al., 2016)	374
5.	Physical Activity of Children: A Global Matrix of Grades Comparing 15 Countries	(Tremblay et al., 2014)	316
6.	Why Are Girls Less Physically Active than Boys? Findings from the LOOK Longitudinal Study	(Telford et al., 2016)	298
7.	Chronic Lack of Sleep is Associated With Increased Sports Injuries in Adolescent Athletes	(Milewski et al., 2014)	290
8.	Changes in weight, physical activity, sedentary behaviour and dietary intake during the transition to higher education: a prospective study	(Deforche et al., 2015)	234
9.	Sport Specialization's Association With an Increased Risk of Developing Anterior Knee Pain in Adolescent Female Athletes	(Hall et al., 2015)	191
10.	Positive Youth Development From Sport to Life: Explicit or Implicit Transfer?	(Turnidge et al., 2014)	167

2) Author Analysis

Figure 3 demonstrates that several of the top 10 most productive researchers in the field of Sport Participation in School have made notable contributions through their publications. Table 2 showed, Post,E.G., Leatherdale, S.t., Mcguine, T.A., Kerr, Z.Y., and Bell, D.R., have all made valuable contributions with twenty one to seventeen articles providing insights into sports participation. They are followed by Brooks, M.A., Kokko, S., Biese, K.M., Watson, A.M., and Dompier, T.P., who have made important contributions with fifteen to twelve articles highlighting critical aspects in research on Sport Participation in School.

However, regarding citation counts, the authors ranking shifts, with McGuine, T.A., leading with the highest number of citations, demonstrating remarkable productivity through his 745 publications. This reflects the researchers dedication to innovation and their contribution to advancing knowledge in the field of sports participation, particularly among school-aged students.

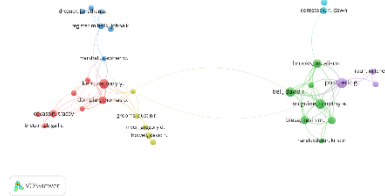


Figure 3. Productive Authors based on Documents and Citation

Table 2. Authors, documents and citations.

Rank	Author	Doc.	Cite	Rank	Author	Doc.	Cite
1.	Post, Eric G.	21	516	6.	Brooks, M. Alison	15	667
2.	Leatherdale, Scott T.	20	142	7.	Kokko, Sami	14	158
3.	Mcguine, Timothy A.	19	745	8.	Biese, Kevin M.	13	300
4.	Kerr, Zachary Y.	18	401	9.	Watson, Andrew M.	12	361
5.	Bell, David R.	17	628	10.	Dompier, Thomas P.	12	339

3) Country Analysis

Table 3 lists the top 10 countries based on document production in the field, with the United States leading at 854 document, followed by Canada with 211, and Australia, United Kingdom, and Spain each contributing 204, 203, and 105 document, respectively. Table 3 reveals the top 10 countries by citations, where United States rank first with 16.082 citations, followed by Canada with 4.160, and Australia with 4.072 citations. Figure 4 illustrates the collaboration network distribution, highlighting the United States as the most central country, followed by the United Kingdom, Canada, and Australia. These countries demonstrate robust academic collaboration and a substantial presence in the field, highlighting their leadership and influence in research on Sports Participation in School.

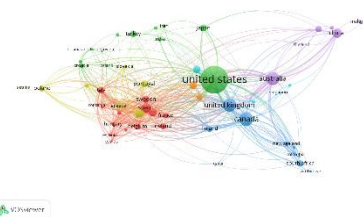


Fig 4. Most productive countries based on documents and citations

Table 3. Country, documents and citations.

Rank	Author	Doc.	Cite	Rank	Author	Doc.	Cite
1	United States	92	1064	6	Germany	17	266
2	United Kingdom	48	540	7	Brazil	16	160
3	Australia	37	816	8	China	14	217
4	Canada	30	276	9	South Africa	14	197
5	Spain	21	400	10	Sweden	14	236

	physical education, practice, primary school, process, relation, role, school sport, secondary school, skill, sport activity, support, teacher, term, understanding, young person			
Cluster 3	Adolescence, baseline, behaviour, bmi, body mass index, child, childhood, children, community, environment, family, government, grade, indicator, influence, mvpa, obesity, peer, physical activity, physical activity level, physical fitness, policy, sedentary behavior, weight, youth	Blue	26,04%	25
Total			100%	96

IV. DISCUSSION

4) Co-occurrence Analysis of Keywords

Keywords offer essential insights into an article's content, and when two or more keywords occur simultaneously within the same article, they are identified as co-keywords (Apriady, Fitri, et al., 2024). Co-keyword analysis is employed to investigate the relationships among concepts or themes within a corpus of literature, uncovering patterns of association and facilitating the identification of clusters of interrelated research topics (Zhao et al., 2019). This approach is instrumental in examining the interconnections between concepts and themes across academic disciplines or specific fields, enabling the identification of dominant themes and emerging trends within scholarly literature (Baako & Abroampa, 2023). In the field of scientific knowledge, co-keyword analysis can be employed to identify trending research topics and monitor the boundaries of research development (Chen et al., 2023). In this study, a co-keyword graph was constructed using the co-keyword function in VOSviewer. The fractional counting method was applied, with a minimum keyword occurrence threshold of 2, and author keywords were utilized as the unit of analysis. Each cluster has been grouped and presented in Table 4 and Figure 5 of the clustering analysis.

Based on the study's findings, several important insights have been identified regarding research trends and contributions in the field of Sport Participation in School between 2014 and 2024. The analysis of publication trends reveals that during the decade, a notable increase began in 2019, peaking in 2021, indicating a growing interest in this field of study. The growth underscores the increasing recognition of the importance of sports participation in schools for enhancing students' lives. The article of significant impact based on the highest citations is authored by Mez et al., (2017), titled "Clinicopathological Evaluation of Chronic Traumatic Encephalopathy in Players of American Football" which has accumulated 758 citations.

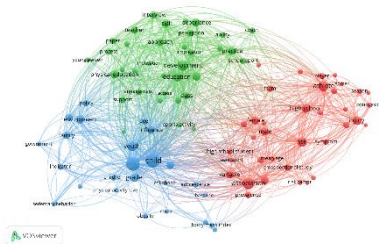


Fig 5. Keyword Analysis

Figure 3 highlights the significant contributions of the top 10 most productive researchers, such as Post, Eric G., Leatherdale, Scott T., McGuine, Timothy A., Kerr, Zachary Y., and Bell, David R. who have collectively published numerous insightful articles in this domain. The contribution not only enriches academic discourse but also reflects a commitment to advancing knowledge and innovation in the realm of sports participation in schools. Table 3 and Table 4 provide insights into the global landscape of research productivity and impact. The United States has established itself as a leader in document production and citations, with Canada and Australia closely following behind. This leadership is further exemplified in Figure 4, which depicts the collaboration networks between countries. The centrality of the United States, along with strong collaborations involving Canada, the United Kingdom, Spain, and China, highlights the global nature of research efforts in Sport Participation for School Students. This phenomenon may be attributed to the predominance of English-language journals and proceedings that are typically indexed by Scopus (Net et al., 2023).

Table 4. Clusters and Keywords based on VOSViewer

Cluster	Item	Colour	Present	Total
Cluster 1	Association, athlete, basketball, comparison, competition, concussion, confidence interval, cross sectional study, female, football, frequency, high school, high school athlete, high school student, injury, main outcome measure, male, mean age, odds ratio, patient, player, prevalence, risk, risk factor, season, sex, significant difference, soccer, study design, symptom, team, team sport, treatment, variable, woman	Red	37,5%	36
Cluster 2	Ability, acces, approach, attitude, barrier, class, coach, development, disability, education, engagement, experience, extracurricular activity, implementation, implication, interview, motivation, paper, perception, person,	Green	36,46%	35

Moreover, the study utilized co-keyword analysis to reveal thematic clusters and interrelationships among various research topics. This methodological framework enabled the identification of principal themes and emerging trends within the literature, providing a systematic understanding of the interconnectivity of ideas and guiding future research avenues. By mapping these co-keyword clusters, this study enhances and broadens the academic discourse surrounding student participation in sports. The emergence of key terms highlights that the topic of student participation in sports is an intriguing area of exploration. Engaging in physical activities significantly influences students' character and plays a fundamental role in the articulation of knowledge as

evaluated within educational institutions. This can be observed from the clusters and their corresponding occurrence percentages, as exemplified in Cluster 2: “physical education, school sport, sport activity, ability, education”, which are frequently mentioned keywords in the analysis documents. However, numerous issues remain insufficiently explored or require additional examination, particularly regarding the impact of various approaches to sports participation on student development. In summary, this extensive analysis offers significant insights into the evolution, trends, and collaborative dynamics of research related to Sports Participation in Schools. These findings not only contribute to current research but also serve as a roadmap for future investigations aimed at enhancing educational outcomes and student development through sports interventions.

The study presents several limitations that merit attention. First, the dependence on English-language publications indexed in Scopus introduces a potential language bias, leading to the exclusion of significant research published in other languages. Second, utilizing Scopus may lead to publication bias, as it does not include all pertinent literature, especially from non-indexed sources or specialized fields. Finally, although the bibliometric approach provides quantitative insights, it may overlook qualitative nuances and contextual details presented by individual studies. This highlights the necessity for careful interpretation of the findings. These limitations emphasize the importance of future research in addressing these gaps and achieving a more comprehensive understanding of sport participation among students.

V. CONCLUSIONS

In summary, this study provides an in-depth analysis of the evolution, trends, and collaborative dynamics of research on Sport Participation in Schools from 2014 to 2024. The analysis reveals fluctuating publication patterns, with a significant increase commencing in 2019 and peaking in 2021, indicating a rising interest in this field of study. Notable contributions include Mez et al. (2017), which has garnered 758 citations, highlighting key challenges and opportunities within the field. Top productive researchers, such as Post, Eric G., Leatherdale, Scott T., Mcguine, Timothy A., Kerr, Zachary Y., and Bell, David R., have made significant contributions to the advancement of knowledge through extensive publications. The United States' prominence in both research output and citation impact, along with its strong international collaborations depicted in Figure 4, highlights its central role and influence in shaping global research priorities. However, the presence of language bias, publication selectivity, and limitations inherent in bibliometric methods highlight the need for future research to engage with more diverse literature sources and incorporate qualitative perspectives, thereby enhancing a more comprehensive understanding and application of sport participation among students.

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