






## Mapping physical activity research in reputable international journals: a bibliometric analysis

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### ABSTRACT

Background: An in-depth understanding of how physical education can catalyze physical activity among students and society at large is becoming increasingly important. Objective: This study aims to determine the development of scientific publications, mapping the scope and theme of publications related to physical activity published in Scopus-indexed journals from 2018 to 2022. The research questions in this study are: (1) How is the development of publications related to physical activity? (2) What are the most cited articles by title? (3) What themes are related to physical activity? (4) What themes are the most interesting to research in the future? Methods: The publish or perish tool is used to access the Scopus database, which is used in this study. Using the keyword "physical activity," 200 articles were published in Scopus-indexed journals. Keyword co-occurrence analysis is used in this study to find and investigate the primary fields and subjects covered in publications. VosViewer is the program that was used to analyze the data. Results: Publications about physical activity tend to need to be more developed. The work by author Piercy, published in JAMA - Journal of the American Medical Association, has received the most citations out of the 200 published articles. Exercise, mental health, COVID-19, and public health are related topics. Researching several themes about the relationship between physical activity and mental health is intriguing. There has yet to be much research done on physical activity in Indonesia, according to the analysis of publications on the subject that show a tendency to decline in Scopus-indexed journals. This presents an opportunity to investigate physical activity in Indonesia, particularly regarding mental health. Conclusion: It was intended that this development would serve as a guide for soccer coaches in mentoring athletes, particularly those at grassroot age.

### ARTICLE HISTORY

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### KEYWORDS

Physical activity; bibliometric; scopus database; mapping; VOSViewer.

### Introduction

Physical activity will provide individuals with many physical, psychological, and social benefits (Wiersma, 2016). Therefore, creating the ability and fundamental motivation to make physical activity a positive lifelong habit from an early age is essential. Therefore, physical education for children and adolescents should prioritize providing positive emotional experiences to encourage the development of long-life physical activity (United et al., 2015). However, physical education as a vehicle for physical activity learning hardly focuses on the opportunity to create lifelong physical activity, even though every child or adolescent participates in physical education learning. Indeed, Bailey & Dismore (2005) discovered that a common objective of physical education is to promote lifelong physical activity in their survey of 52 countries worldwide.

This goal is not without reason, as much of the literature suggests that physical education as an appropriate element to promote physical activity during childhood is the most appropriate means to promote lifelong participation in sports and physical activity (Fairclough & Stratton, 2005; McKenzie, 2001; Shephard & Trudeau, 2000).

In most developed countries, children receive physical education lessons between the ages of 5 and 16 (Hardman & Marshall, 2009; Pühse & Gerber, 2005). However, many children do not implement lifelong physical activity in sports or other physical activities (Green, 2002). MacNamara et al. (2011) argues that the factor of the ineffectiveness of physical education in providing lifelong physical activity experience is at least partly due to the low quality of learning in physical education.

Further research conducted by Hardman & Marshall (2009) shows a cause for concern regarding the contribution of physical education learning in developing and developed countries. As a result of poor physical education systems, the foundations provided could be more consistent at the basic movement level. Physical education at the secondary level is primarily focused on team sports and other physical activities that may not provide students with the skills they need to participate in sports and physical activity for the rest of their lives (Fairclough et al., 2002; Kirk, 2009; Penney & Jess, 2004). The movement skills, knowledge, and comprehension necessary for lifetime participation are not "integral, explicit, and valuable elements of physical education," according to other studies on the subject (Penney & Jess, 2004).

The role of physical education in promoting physical activity is essential for gaining an in-depth understanding of trends, approaches, and scientific contributions in this domain. Physical education plays a central role in shaping individuals' physical behavior. Through bibliometric analysis, this study aims to detail the contributions of leading Scopus-indexed journals and identify research consensus and developments in understanding how physical education can effectively motivate and guide individuals to lead physically active lifestyles.

The urgency of this research lies in the vital role of physical education in meeting the challenges of the physical crisis and sedentary lifestyle in society. An in-depth understanding of how physical education can catalyze physical activity among students and society at large is becoming increasingly important. Bibliometric analyses will reveal significant research trends, guide educational policy development, and provide critical insights into the teaching methods and strategies that are most effective in increasing students' physical engagement. The findings from this study can provide a solid scientific basis for advancing the role of physical education as a vital tool in motivating and maintaining sustained physical activity. This study aims to identify publications on physical activity and describe the characteristics of these studies. Bibliometric analysis was used in this study to explore the characteristics of publications on physical activity and to understand research trends in this field. This study aims to examine the development of publications and map the scope of physical activity research. The research process focused on answering the following research questions: (1) How is the development of publications related to physical activity? (2) Who are the published articles' main contributors (Author and Journal Name)? (3) What themes are related to physical activity? (4) What themes are most interesting for future research?

## **Method**

With the help of the VOSViewer tool, this study applied a bibliometric analytic approach. For the study's aims, a systematic search was done utilizing the Scopus database. This bibliometric study uses Scopus Database data as its data source, using publish or perish techniques. On December 28, 2022, information from published sources from 2018 to 2022 was obtained using the keyword "physical activity" from the Scopus database, with a 500-maximum payout. The publish or perish device's search results found two hundred journal articles. The data was then stored in a file with the RIS/References

manager extension to make it more organized, and the researcher used the Mendeley tool to update the journal article's identity. VosViewer was utilized by researchers to provide a presentation that examines co-authorship, overlay visualization, and keyword co-occurrence. Figure 1 is the search flow for metadata sourced from the Scopus database.

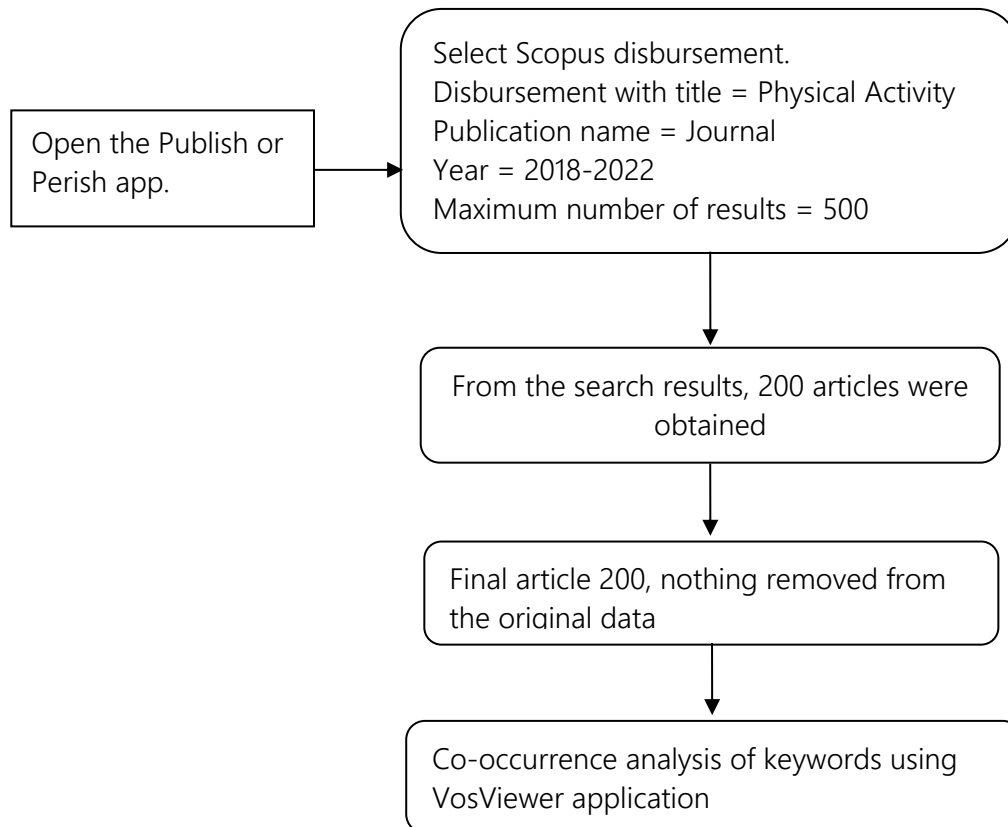


Figure 1. Article metadata from google scholar using publish or perish application.

## Results and Discussion

### Result

#### *The development of research on physical activity*

Publication of physical activity articles published in the Scopus database from 2018 to 2022 has fluctuated. In five years, 2018 became the most significant year with 78 publications, and in 2022, no articles about physical activity were found in Scopus-indexed journals. More details regarding the development of research on physical activity in Scopus-indexed journals can be seen in Figure 2.

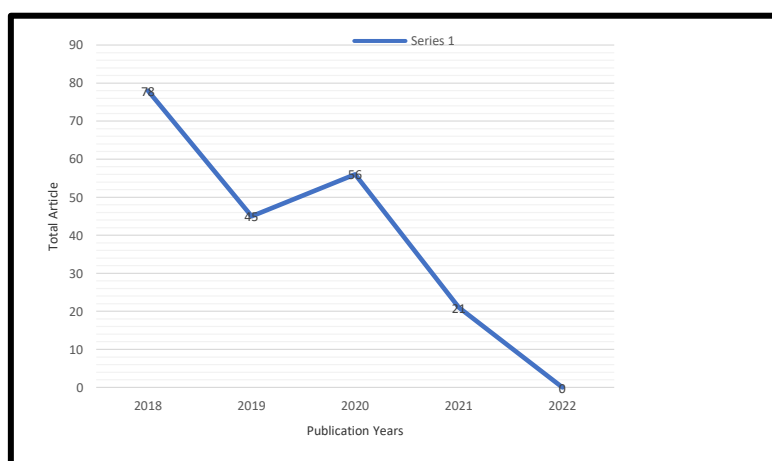


Figure 2. Graph of physical activity publications

*Most Cited Articles*

Citation is one of the indicators of whether a publication has an impact; the higher the number of citations, the more valuable it is for academia. Based on data obtained from publish or perish about physical activity published in the Scopus database in 2018-2022, the most cited articles are the writings of Piercy, with 2126 citations, and Bull, with 1947 citations. Here are the top five most cited articles related to physical activity.

Table 2. Top Five Most Cited Articles.

Citation	Authors	Title	Year	Source	GS Rank
2126	Piercy et al. (2018)	The physical activity guidelines for Americans	2018	JAMA - Journal of the American Medical Association	1
1947	Bull et al. (2020)	World Health Organization 2020 guidelines on physical activity and sedentary behaviour	2020	British Journal of Sports Medicine	2
656	Stanton et al. (2020)	Depression, anxiety, and stress during COVID-19: Associations with changes in physical activity, sleep, tobacco, and alcohol use in Australian adults	2020	International Journal of Environmental Research and Public Health	3
605	Schuch et al. (2018)	Physical activity and incident depression: A meta-analysis of prospective cohort studies	2018	American Journal of Psychiatry	4
574	Chen et al. (2020)	Coronavirus disease (COVID-19): The need to maintain regular physical activity while taking precautions	2020	Journal of Sport and Health Science	5

Based on Table 2, the most cited article titles are the physical activity guidelines for Americans, World Health Organization 2020 Guidelines on physical activity, and sedentary behavior. When looking at these two articles, many authors cite or want to know about steps to increase physical activity.

*Physical Activity Cluster*

The study data's network visualization analysis using VosViewer revealed that phrases frequently occurring with the fewest keyword occurrences option 3 obtained 66 thresholds out of 478 keywords. The terms "physical activity," "exercise," "public health," "covid-19," and "mental health" are among the most frequently occurring ones. Table 3 shows the profiles of 10 often occurring research terms out of 66 research keywords. Conversely, Figure 3 shows the research's density visualization.

Table 3. Publication profile on physical activity

No	Keyword	Occurrences	Total Link strenght
1	Physical Activity	95	224
2	Exercise	37	93
3	Public Health	13	40
4	Covid-19	16	33
5	Mental Health	10	28
6	Meta-Analysis	9	27
7	Epidemiology	8	26
8	Sedentary Behavior	9	26
9	Sedentary	7	23
10	Depression	8	23

**Source:** Disbursement of articles in the scopus database using publish or perish analysed using VosViewer (28 December 2022).

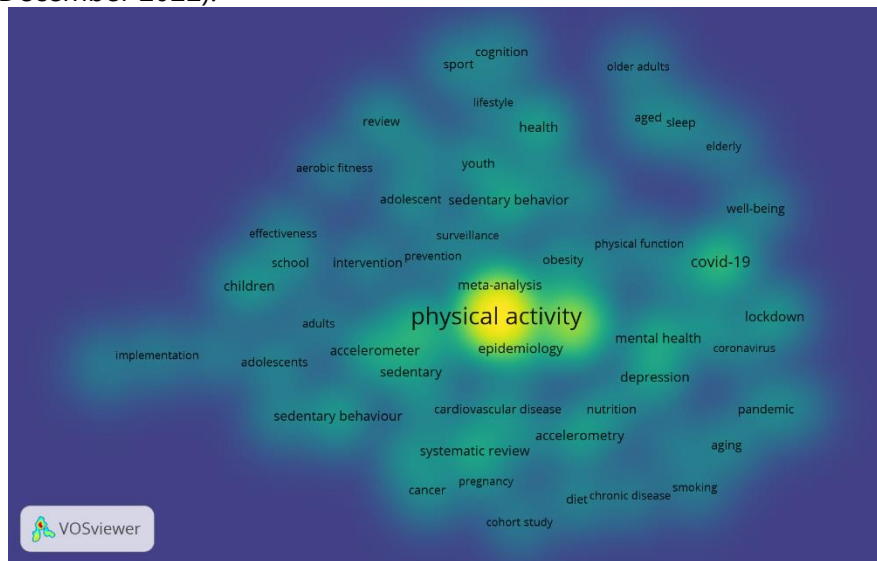


Figure 3. Occurrence Visualisation of the Keyword Physical Activity

Source: Publication of papers in the Scopus database through VosViewer analysis of publish or perish (28 December 2022).

Furthermore, co-occurrence analysis forms physical activity clusters based on the keywords with the highest frequency. Figure 4 shows how the clusters are divided.

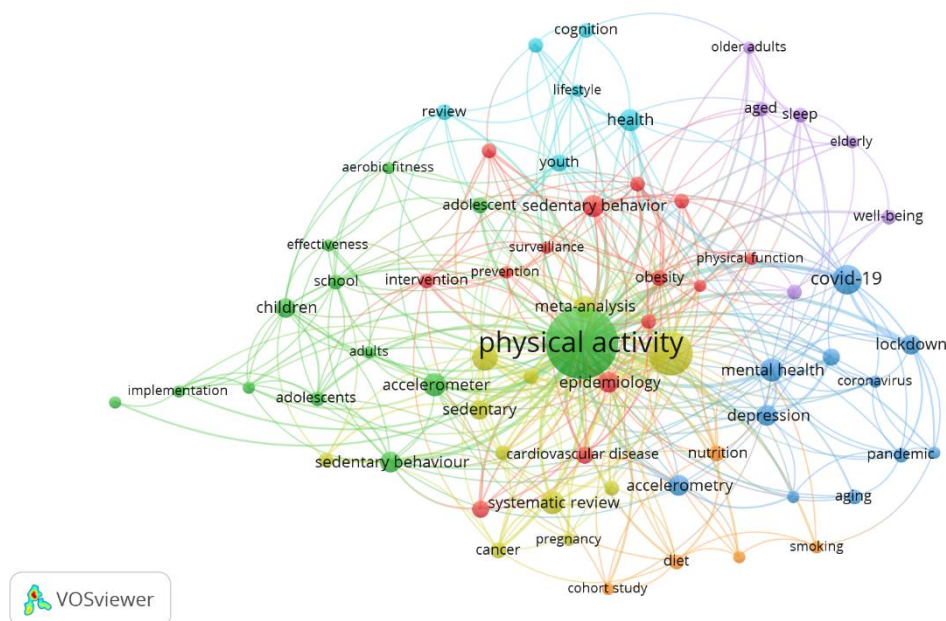


Figure 4. Frequency of frequently occurring keywords in Physical Activity.

Source: Disbursement of articles in the scopus database using publish or perish analysed using VosViewer (28 December 2022).

Figure 4 is visually divided into 7 clusters, namely 1) cardiovascular disease, 2) accelerometer, 3) accelerometry, 4) cancer, 5) aged, 6) cognition, and 7) chronic disease. Based on data analyzed from 2018 to 2022 and visually presented in Figure 5, the VosViewer application offers data related to developing publications on physical activity from year to year.

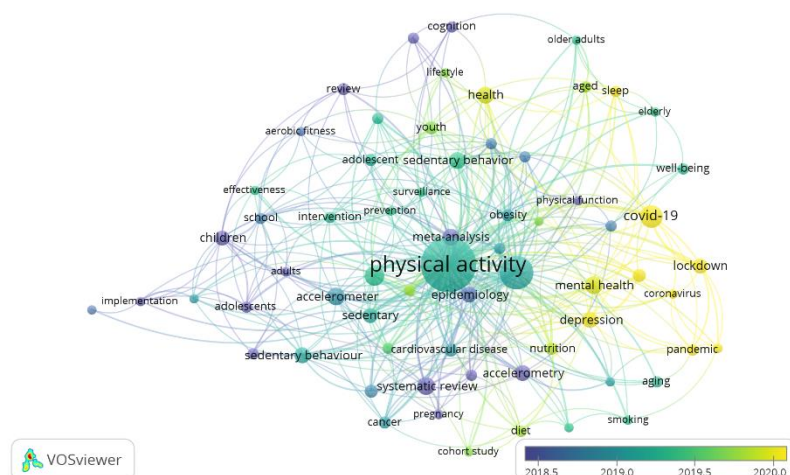


Figure 5. Average maximum frequency in physical activity by year of publication.

Source: Publication of articles in the Scopus database through analysis of publish or perish VosViewer (28 December 2022).

Based on Figure 5, the brighter the color, the more recent the research. This means that physical activity research related to COVID-19, lockdown, depression, and mental health has only been conducted in the range of 2020.

## Discussion

Based on the results of research from 200 journal articles on physical activity published in Scopus-indexed journals, 95% of these articles were published in journals with a focus on health studies, such as articles with the title "The Physical Activity Guidelines for Americans" published in the Journal of the American Medical Association (Piercy et al., 2018), "The 2020 World Health Organization guidelines on physical activity and sedentary behavior" published in the British Journal of Sports Medicine (Bull et al., 2020), an article entitled "Depression, anxiety and stress during COVID-19: Associations with changes in physical activity, sleep, tobacco and alcohol use in Australian adults" published in the International Journal of Environmental Research and Public Health (Stanton et al., 2020). Thus, studies on physical activity are related to health.

When analyzed from the author's country of origin, out of 200 journal articles, there are no authors from Indonesia (Schuch et al., 2018), Brazil (Pitanga et al., 2020), China (Nieman & Wentz, 2019) From the USA. This is undoubtedly an opportunity for researchers in Indonesia to conduct research related to physical activity so that it is expected to be published in Scopus-indexed journals. In bibliometric research related to physical activity using VosViewer tools, this research has decreased since 2018, as evidenced in 2022; no articles published in the Scopus database related to physical activity. However, there are some interesting studies to be researched in the future, namely those related to mental health and depression. This is because in previous studies, there were many reviews related to physical activity during the pandemic, so further research is needed regarding the impact of habits during the pandemic on a person's mental health and depression.

According to several articles published in Scopus-indexed journals, not many physical activities are associated with physical education, even though the role of physical education is very important in increasing or promoting awareness of physical activity (Sallis et al., 2012). Physical education is a fundamental mechanism for promoting physical activity among individuals, particularly in educational settings. Physical education provides structured opportunities for students to engage in various physical

activities, from aerobic exercises to team sports (Fernandez-Rio, 2016). The curriculum often includes activities that enhance cardiovascular fitness, muscular strength, flexibility, and overall motor skills. By incorporating a diverse range of physical activities, physical education encourages active participation and helps individuals discover enjoyable forms of exercise. Including skill development, teamwork, and promoting a positive attitude toward physical activity creates a foundation for a lifelong commitment to staying active (Simpson & Mandich, 2012).

Additionally, physical education can serve as a platform for imparting knowledge about the importance of maintaining a physically active lifestyle and the associated health benefits. Engaging in regular physical activity has far-reaching implications for overall health and well-being. Firstly, it plays a pivotal role in maintaining and improving physical health. Physical activity contributes to cardiovascular health by enhancing heart and lung function, reducing the risk of cardiovascular diseases (Timmis et al., 2018). It also aids in weight management, muscle toning, and bone density improvement. Beyond physical health, regular physical activity has a profound impact on mental health. Exercise is associated with the release of endorphins, often referred to as "feel-good" hormones, which can alleviate stress, anxiety, and depression. Furthermore, physical activity enhances cognitive function, improving concentration, memory, and overall mental well-being.

Regarding disease risk, engaging in physical activity is linked to a decreased likelihood of developing various chronic conditions. Regular exercise is associated with a lower risk of type 2 diabetes, certain cancers, and osteoporosis (Kouvonen et al., 2012). Physical activity also helps regulate blood pressure and cholesterol levels and promotes better sleep patterns, all contributing to a reduced risk of cardiovascular diseases. Overall, the positive impact of physical activity extends across multiple dimensions of health, encompassing both physical and mental well-being while serving as a preventative measure against numerous diseases.

## Conclusions

This bibliometric research aims to convey the mapping of related research related to physical activity, with the discovery of themes, research trends, and research links that can facilitate further research to map what kind of research is worth implementing. In addition, with this research, journals indexed in the Scopus database that publish much research related to physical activity are journals with the scope of health. While physical activity articles related to physical education still need to be widely discussed. In the future, research related to the contribution of physical education to physical activity will be carried out by many researchers from Indonesia to positively impact the development of education, health, and sports in Indonesia.

## Authors' contributions

KP is responsible for data compilation and analysis, article conception, writing, and revision. W, S, YS and K responsible for article conceptualization as well as strict and critically revised manuscripts. All authors read and approved the final manuscript.

## Competing interests

The authors declare no competing interests.

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