



Review Article

Global Research Trends on Gymnastics in Physical Education: A Scopus-Based Bibliometric Analysis

Lucy Oktavani^{1ABCD}, Marsika Sepyanda^{1ABCD} and Rina Mayangsari^{1CDE}

¹Universitas Negeri Padang

Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

Corresponding Author: Marsika Sepyanda, e-mail: marsikayanda@unp.ac.id

Accepted for Publication: February 18, 2026

Published: March 30, 2026

DOI: 10.17309/tmfv.2026.2.05

Abstract

Objectives. This study aims to understand global research trends on gymnastics in physical education by conducting a bibliometric analysis of documents indexed in the Scopus database from 2015 to 2025.

Materials and Methods. Data were extracted using the keywords “gymnastics” and “physical education,” filtered by document type (articles and reviews) and language (English). A total of 297 documents were analyzed. VOSviewer software was used to visualize keyword co-occurrence relationships.

Results. The results show a fluctuating publication trend, with a peak in 2019, followed by a decline after 2021, suggesting a temporary shift during the COVID-19 pandemic period. The United States, the United Kingdom, and Spain emerged as the most productive countries, while Cardiff Metropolitan University and Loughborough University were identified as leading institutions. Keyword co-occurrence mapping revealed five major thematic clusters: (1) gymnastics pedagogy and student learning, (2) motor learning and movement coordination, (3) biomechanics and injury prevention, (4) health, motivation, and exercise, and (5) technology-enhanced physical education.

Conclusions. These findings indicate that the field has evolved from a biomechanical and performance-based perspective to a more interdisciplinary approach integrating health, education, and technology. The study provides insights for educators, policymakers, and researchers to strengthen collaboration, integrate digital learning tools, and advance innovative teaching practices in gymnastics education.

Keywords: gymnastics, physical education, bibliometric analysis, Scopus, research trends.

Introduction

Gymnastics is one of the foundational disciplines in physical education that plays a critical role in developing students' motor skills, physical literacy, and body coordination from an early age. It is not just a sport, but a type of movement education that combines strength, flexibility, balance, and rhythm which are important as key elements that help develop physical abilities for a lifetime. (Sawicki et al., 2018). As an integral part of physical education curricula worldwide, gymnastics promotes not only physical fitness but also creativity, discipline, and self-confidence (Viciene et al., 2015). In recent years, educators and researchers have paid increasing attention to how gymnastics can support holistic development in students, including cognitive and socio-emotional aspects of learning through movement.

The evolution of gymnastics pedagogy within physical education has been influenced by changes in educational philosophy and the broader movement towards competence-based and inclusive curricula (Krüger, 2018). Traditional gymnastics teaching often emphasized performance mastery and competition; however, recent approaches have shifted toward learning experiences that focus on participation, exploration, and safety in movement (Bertills & Björk, 2024). This transformation aligns with the goals of twenty-first-century physical education, which seeks to balance performance achievement with personal development, health, and well-being (Lindsay & Spittle, 2024). In this context, gymnastics serves as an ideal platform for cultivating students' psychomotor and affective domains while fostering motivation and lifelong engagement in physical activity.

From a research perspective, the study of gymnastics in physical education involves various domains such as biomechanics, motor learning, injury prevention, pedagogy, and psychology. For instance, Abdollahipour et al. (2015)

demonstrated that an external focus of attention improves performance in gymnastics skills, highlighting the cognitive dimensions of skill acquisition. Similarly, studies on injury epidemiology among young athletes, including gymnasts, have informed safety protocols and preventive training designs (Changstrom et al., 2015). Other scholars have explored gender participation, inclusion, and the use of digital technologies to enhance teaching and assessment in gymnastics-based learning environments (Harris & Cale, 2018; Jastrow et al., 2022). Therefore, these studies illustrate that gymnastics research has evolved beyond physical performance to address multidimensional educational and health-related outcomes.

Despite the growing volume of gymnastics-related research, the conceptual distinction between gymnastics as an educational content in physical education and gymnastics as an elite or competitive sport remains insufficiently articulated in the literature (Leite et al., 2023). In physical education, gymnastics is positioned as a curriculum-based learning domain implemented in school and higher education settings, emphasizing pedagogical objectives such as motor development, learning processes, safety, and student engagement. In contrast, elite or competitive gymnastics research is primarily oriented toward performance optimization, high-level athlete preparation, and biomedical outcomes. Given this distinction, it is essential that research syntheses explicitly justify their relevance to pedagogical PE contexts. Therefore, this study deliberately focuses on publications in which gymnastics is examined as a teaching and learning medium within physical education, rather than as a specialized competitive discipline, ensuring alignment with educational aims and curricular practice.

In recent years, bibliometric studies have gained recognition in sports and educational sciences as a means to understand how research fields evolve and interact. For example, Rahayu et al. (2023) conducted a bibliometric review of physical activity and health promotion, revealing the dominant themes and collaboration networks driving the field. Similarly, (Avila-garzon & Bacca-acosta, 2021) examined educational technology research trends, offering insights into pedagogical innovation. However, within the domain of gymnastics, particularly in the context of school-based physical education, such comprehensive bibliometric mapping remains scarce. Considering the interdisciplinary nature of gymnastics which consists of spanning sport science, pedagogy, and psychology, analyzing its publication patterns can provide an integrated understanding of how the discipline contributes to educational and health-related outcomes globally.

The importance of conducting a bibliometric analysis on gymnastics in physical education lies not only in identifying quantitative trends but also in understanding the intellectual structure of the field. For instance, the identification of highly cited works such as Changstrom et al. (2015) and Silva & Paiva (2015) highlights the intersection of health and performance research, reflecting a dual emphasis on athlete well-being and skill optimization. Moreover, the inclusion of diverse subject areas such as social sciences, psychology, arts, health, and multidisciplinary studies, demonstrates that gymnastics research extends far beyond sport performance, intersecting with human development, learning theory, and wellness education. This interdisciplinary character

reinforces the role of gymnastics as both an academic and practical field relevant to contemporary educational goals.

In the digital era, the teaching and learning of gymnastics are also being transformed by emerging technologies such as virtual reality, motion analysis systems, and digital coaching tools. These innovations offer new possibilities for enhancing student engagement, personalized feedback, and movement visualization (Bonanno et al., 2022). As global education systems increasingly adopt technology-enhanced physical education, research on gymnastics must adapt to explore how such tools influence motor learning and student outcomes. Therefore, analyzing research trends in gymnastics not only reflects past achievements but also anticipates future directions shaped by digital pedagogy, inclusivity, and health promotion.

Related to these considerations, this study aims to conduct a comprehensive bibliometric analysis of research on gymnastics in physical education published in the Scopus database from 2015 to 2025. Specifically, the study seeks to (1) identify the publication trends, most productive authors, institutions, and countries; (2) determine the leading journals and citation patterns; and (3) visualize the thematic clusters and emerging research frontiers through keyword co-occurrence mapping. By providing a systematic overview of the global knowledge structure in this domain, this study contributes to the advancement of evidence-based understanding of how gymnastics functions as an educational and scientific field. The findings are expected to inform educators, researchers, and policymakers in designing innovative and inclusive gymnastics programs that align with the goals of modern physical education.

Materials and Methods

This study conducted a bibliometric research design to systematically map and analyze global publication trends on gymnastics in the field of physical education. Bibliometric analysis is a quantitative method used to evaluate scientific literature, allowing researchers to identify patterns, networks, and research dynamics within a specific field (Donthu et al., 2021). Through citation data, keyword analysis, and co-authorship mapping, bibliometric methods help visualize the intellectual structure and thematic evolution of a research domain. This approach is particularly effective for disciplines that intersect multiple fields, such as physical education, sport science, and pedagogy, where traditional literature reviews may not capture the full scope of scholarly development.

Data Source and Search Strategy

The data for this study were retrieved from the Scopus database, one of the most comprehensive and widely used repositories for peer-reviewed academic literature. Scopus was selected due to its extensive coverage across social sciences, education, and health disciplines, as well as its advanced analytical features for bibliometric research (Baas et al., 2020). The search process was conducted on October 29, 2025, using the following query string in the "Article Title, Abstract, and Keywords" fields: (KEY (gymnastic*) AND KEY (physical education)) AND PUBYEAR > 2014 AND PUBYEAR < 2026

Table 1. Applied Filters for Data Retrieval from Scopus

Filter Category	Description / Criteria Applied	Rationale
Database Source	Scopus (Elsevier)	Chosen for its wide coverage in education, sport science, and multidisciplinary fields.
Search Field	Title, Abstract, and Keywords	To capture publications directly related to the topic
Search Query	(KEY (gymnastic*) AND KEY (physical education))	Ensures focus on gymnastics within the context of physical education
Publication Year	2015–2025	Represents the most recent decade of research development
Document Type	Article	Focused on peer-reviewed journal articles to ensure academic rigor
Language	English	Selected for global accessibility and comparability
Subject Areas	Social Sciences (SOCI), Psychology (PSYC), Arts and Humanities (ARTS), Multidisciplinary (MULT), Health Professions (HEAL)	To include interdisciplinary studies related to physical education and human movement
Data Export Format	CSV and RIS	Compatible with bibliometric tools (VOSviewer)
Data Collection Date	October 29, 2025	Ensures the dataset reflects the latest publications up to 2025

To ensure the relevance, quality, and consistency of the dataset, several inclusion filters were applied during the data extraction process. The applied criteria are summarized in Table 1.

After applying these filters, a total of 297 documents were identified as relevant to gymnastics in physical education. The records were exported in both CSV and RIS formats for subsequent analysis using VOSviewer.

Screening and Selection Procedure

Study selection was conducted independently by two reviewers with academic expertise in gymnastics research and bibliometric methodology. Both reviewers possess prior experience in physical education scholarship and quantitative research mapping, ensuring both content relevance and methodological rigor in the screening process. The initial screening was based on title and abstract evaluation to determine alignment with the predefined inclusion criteria, specifically focusing on studies examining gymnastics within pedagogical and physical education contexts rather than elite or purely competitive sport performance domains. Independent screening is recommended in bibliometric and evidence synthesis research to enhance objectivity, reduce selection bias, and strengthen methodological transparency (Donthu et al., 2021; Page et al., 2021).

Following the preliminary screening, full-text verification was conducted for records that met the inclusion criteria or where eligibility remained uncertain. Disagreements regarding inclusion or exclusion were resolved through structured discussion aimed at reaching consensus. This dialogic validation process ensured that decisions were grounded in conceptual clarity and consistent application of the research scope. When consensus could not be achieved, a third reviewer—an expert in bibliometric studies with extensive experience in research evaluation and scientific mapping—was consulted to provide an independent judgment. The involvement of a third reviewer in resolving discrepancies is widely acknowledged as a best practice to improve reliability and methodological credibility in systematic and bibliometric reviews (Aria & Cuccurullo, 2017).

To further ensure transparency and replicability, all inclusion and exclusion decisions were documented during the screening process. The reviewers adhered to predefined criteria related to publication type, language, time frame, and subject relevance as specified in the methodological framework. This structured selection procedure strengthens the internal validity of the bibliometric dataset and aligns with established guidelines for conducting rigorous and reproducible bibliometric analyses in interdisciplinary research domains (Donthu et al., 2021).

Data Extraction and Preparation

Each record extracted from Scopus contained essential bibliographic information, including author names, article titles, publication year, journal source, institutional affiliation, country, keywords, abstract, and citation counts. Duplicate records were identified using Scopus document identifiers and manually cross-checked to avoid redundancy. Author name disambiguation was conducted by standardizing variations in initials and surname formats to ensure accurate co-authorship mapping. Keyword normalization was performed by merging synonymous terms (e.g., “PE” and “physical education”) and correcting spelling inconsistencies to improve the accuracy of co-occurrence analysis. The final dataset represented the global research output in gymnastics-related physical education over the past decade.

To enhance analytical depth, metadata were structured for both quantitative and network analyses. This preparation allowed the data to be processed by using VOSviewer (version 1.6.20) for bibliometric analysis.

Bibliometric Indicators

The bibliometric analysis focused on both quantitative and relational indicators to describe the structural and thematic characteristics of gymnastics-related research in physical education. These indicators were selected based on standard bibliometric frameworks (Donthu et al., 2021). The specific indicators used in this study are summarized in Table 2.

These indicators collectively enabled a comprehensive understanding of the quantitative output, intellectual structure, and collaborative networks in the field. Productivity indicators revealed the most active contributors and sources; impact indicators highlighted influential works and citation patterns; and relational indicators demonstrated how authors and institutions collaborate across disciplines.

Visualization was primarily performed using VOSviewer (version 1.6.20) to generate network maps for co-authorship, co-occurrence, and citation analysis. The integration of these tools allowed for a multidimensional representation of the research landscape, providing both descriptive and structural insights into the development of gymnastics-related scholarship in physical education.

Visualization and Network Analysis

VOSviewer was used to construct and visualize bibliometric networks, including co-authorship, co-occurrence, and citation maps. VOSviewer is particularly effective for analyzing large datasets and generating intuitive visual representations of relationships among authors, keywords, and documents (Bus, 2023; Jan & Ludo, 2010). The software applies a mapping technique where nodes represent items (e.g., authors, keywords), and the size of each node indicates its frequency or citation impact. The proximity between nodes reflects the strength of their relationship, while colors denote thematic clusters or communities within the field.

The co-occurrence analysis of author keywords was used to identify the most frequently used terms and the conceptual structure of the field. Keywords such as gymnastics, physical education, motor learning, biomechanics, injury prevention, and teaching strategies were expected to dominate the network.

Co-authorship mapping was performed to reveal collaborative networks across countries and institutions, showing which regions contribute most actively to gymnastics education research. Meanwhile, citation analysis identified the most influential works shaping the knowledge base, such as those by Abdollahipour et al. (2015) and Changstrom et al. (2015).

In addition to VOSviewer was employed for statistical analysis of bibliometric indicators. This tool enabled the generation of descriptive statistics such as annual publication growth rate, author productivity index, and source impact metrics (h-index, g-index, m-index) as well as thematic evolution analysis to trace how topics in gymnastics education have developed over time (Jan & Ludo, 2010).

Reliability and Limitations

The reliability of bibliometric analysis depends on the completeness and accuracy of the database. Although Scopus provides extensive coverage, some relevant works indexed in other databases (e.g., Web of Science or ERIC) may not be included. Additionally, variations in author naming conventions and keyword usage can affect clustering accuracy. To mitigate these issues, data cleaning and normalization procedures were applied before analysis. Despite these limitations, bibliometric methods remain robust for identifying macro-level patterns and providing an empirical foundation for understanding global research dynamics (Donthu et al., 2021).

Protocol Registration

Protocol registration: Not applicable. This study applied a bibliometric design using publicly available

Table 2. Bibliometric Indicators and Their Analytical Purposes

Category	Indicator	Analytical Focus/ Objective	Expected Output/ Visualization
Productivity Indicators	Annual Publication Trends	To identify growth patterns in the number of publications from 2015–2025	Line chart of yearly publication output
	Most Productive Authors	To determine authors with the highest number of publications in the dataset	Author productivity ranking and h-index distribution
	Most Productive Journals	To identify key journals publishing on gymnastics in physical education	Source impact table (number of articles, citations, impact index)
	Institutional and Country Productivity	To highlight active institutions and nations contributing to the field	Geographical mapping of publication distribution
Impact Indicators	Citation Analysis	To assess the influence of authors, journals, and individual articles	Top-cited documents and citation network
	Source Impact Metrics (h-index, g-index, m-index)	To evaluate the quality and influence of key journals or authors	Statistical summary generated
Relational Indicators	Co-authorship Analysis	To reveal collaboration networks among authors, institutions, and countries	Network visualization (nodes = authors/institutions; links = collaborations)
Thematic Evolution	Keyword Co-occurrence	To identify dominant research themes and conceptual clusters	Thematic cluster map generated using VOSviewer
	Co-citation Analysis	To explore intellectual connections among frequently cited works	Citation network map (VOSviewer)
	Thematic Trend Mapping	To track the evolution of research topics and emerging trends over time	Trend graph and thematic evolution map

secondary data from the Scopus database and did not involve human participants or interventional procedures requiring formal registration. While protocol registration is commonly recommended for systematic reviews of clinical or intervention studies to enhance transparency (Page et al., 2021), it is not a standard requirement for bibliometric analyses. However, the search strategy, inclusion criteria, screening procedures, and analytical framework were predefined and clearly reported to ensure methodological transparency and reproducibility in line with established bibliometric guidelines (Donthu et al., 2021).

Results

Analysis of Documents by Year

The analysis of publication trends provides valuable insights into the development and evolution of research interest in gymnastics within the field of physical education. Examining annual publication output helps to understand how scholarly attention toward this topic has shifted over time, reflecting broader academic, pedagogical, and societal influences on physical education research.

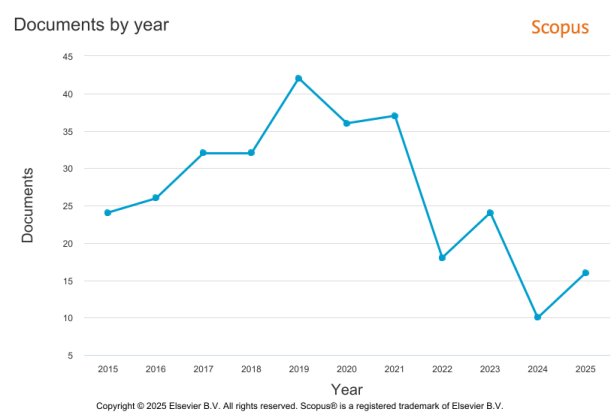


Fig. 1. Annual Distribution of Publications on Gymnastics in Physical Education (2015–2025). Source: Scopus database (analyzed on October 29, 2025)

As illustrated in Figure 1, the number of documents published on gymnastics in physical education between 2015 and 2025 demonstrates a fluctuating yet dynamic pattern. In 2015, there were 24 publications, and this figure increased slightly to 26 in 2016. A steady upward trend continued through 2017 and 2018, each recording 32 documents, indicating growing scholarly engagement with the topic during this period. The peak occurred in 2019, when the number of publications reached 42, marking the most productive year within the decade.

After 2019, publication activity began to decline moderately, with 36 documents in 2020 and 37 documents in 2021, suggesting a stabilization phase. However, in 2022, the number of publications fell sharply to 18, likely influenced by the global educational disruptions caused by the COVID-19 pandemic. A brief recovery occurred in 2023 with 24 publications, but the figure again dropped to its lowest point of 10 in 2024, followed by a modest increase to 15 documents in 2025.

Therefore, the data indicate that research on gymnastics in physical education was most active between 2017 and 2021, a period characterized by increased academic exploration of movement learning, pedagogy, and health-related issues. The subsequent decline may reflect a diversification of research themes toward digital-based physical education and interdisciplinary health promotion studies.

Analysis of Documents per Year by Source

Understanding the distribution of publications across journals provides insight into where research on gymnastics in physical education is most frequently disseminated. It also highlights the preferred outlets for scholars in the field and identifies key sources that shape the scientific discourse.

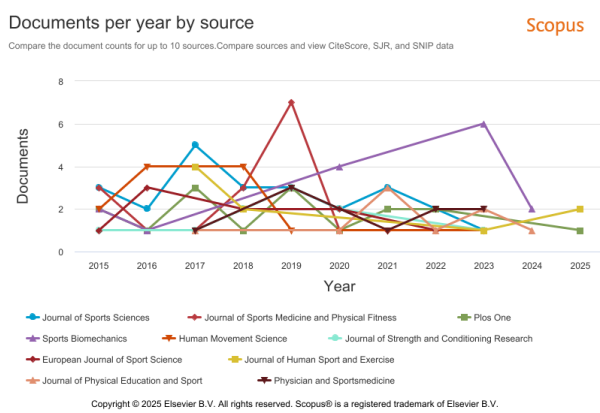


Fig. 2. Documents per year by source (Top 10 journals publishing studies on gymnastics in physical education, 2015–2025). Source: Scopus database (analyzed on October 29, 2025)

As shown in Figure 2, the ten most active journals publishing studies related to gymnastics and physical education between 2015 and 2025 include the Journal of Sports Sciences, Journal of Sports Medicine and Physical Fitness, Plos One, Sports Biomechanics, Human Movement Science, Journal of Strength and Conditioning Research, European Journal of Sport Science, Journal of Human Sport and Exercise, Journal of Physical Education and Sport, and Physician and Sportsmedicine.

Among these sources, the Journal of Sports Sciences consistently appeared as a leading publication outlet, particularly active between 2017 and 2021, with peaks in 2017 and 2021, each contributing around four to five articles per year. The Journal of Sports Medicine and Physical Fitness also demonstrated notable productivity, showing a visible peak in 2019, which corresponded to an increase in health-related studies and sports performance assessments during that period.

Sports Biomechanics showed a steady increase in publication output, reaching its highest point in 2023 with approximately six documents. This pattern reflects growing scholarly attention toward biomechanical and motor learning perspectives in gymnastics-related research. Similarly, Human Movement Science and the Journal of Strength and Conditioning Research exhibited moderate but consistent publication activity, emphasizing performance analysis, training design, and physical education pedagogy.

Other journals such as the *European Journal of Sport Science* and *Journal of Human Sport and Exercise* contributed regularly to the topic, indicating the interdisciplinary nature of gymnastics research that bridges sport science and educational practice. The *Journal of Physical Education and Sport* maintained a stable presence throughout the decade, reinforcing its relevance as a platform for pedagogical and practical studies in physical education.

In general, the results suggest that the dissemination of gymnastics-related research spans a wide range of journals, from sport science to multidisciplinary education outlets. This diversity indicates that gymnastics is studied not only as a performance discipline but also as an educational and developmental medium, connecting research across biomechanics, health, and teaching innovation

Analysis of Documents by Country or Territory

Examining the geographical distribution of publications provides an overview of the countries that have contributed most actively to research on gymnastics in physical education. Country-level analysis helps identify regional strengths, collaborative potential, and global patterns in the dissemination of scholarly work.

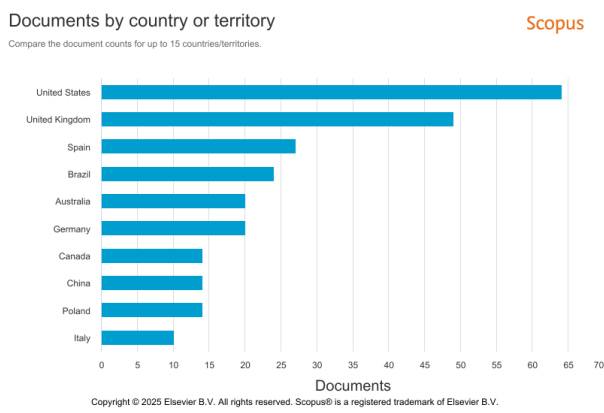


Fig. 3. Distribution of publications by country or territory (Top 10 countries, 2015–2025). Source: Scopus database (analyzed on October 29, 2025)

As presented in Figure 3, the United States dominates the research output with approximately 66 publications, representing the most significant contribution to global studies in this field. This strong presence reflects the country’s well-established research culture in sport sciences and physical education, supported by numerous academic institutions and professional organizations. The United Kingdom follows closely with 49 documents, indicating a robust academic engagement in educational and health-oriented gymnastics research.

European countries also show notable contributions, particularly Spain with 29 publications and Germany with 20 publications, reflecting the growing research interest in gymnastics pedagogy and motor learning in European contexts. Meanwhile, Brazil emerges as the leading country from South America with 24 publications, highlighting its active participation in sport and physical education research at the international level.

Among the English-speaking nations, Australia and Canada also demonstrate consistent productivity, each contributing between 18 and 20 publications. Their involvement often emphasizes applied research in movement education, health promotion, and teacher training. Asian participation is represented primarily by China, which recorded approximately 15 publications, indicating a growing engagement in biomechanics and performance-based studies in gymnastics. Additionally, Poland and Italy contribute around 12–14 publications each, underscoring the European region’s diverse engagement in gymnastics-related scholarship.

To sum up, the global distribution of publications shows that the majority of research originates from North America and Europe, followed by emerging contributions from South America and Asia. This pattern suggests that while Western nations currently lead the discourse on gymnastics and physical education, there is an increasing global interest and potential for broader international collaboration in the coming years.

Analysis of Documents by Author

The analysis of author productivity provides an overview of the researchers who have contributed most extensively to the body of literature on gymnastics in physical education. This indicator helps identify key figures shaping the development of knowledge in the field and highlights patterns of authorship that reflect collaboration and thematic specialization.

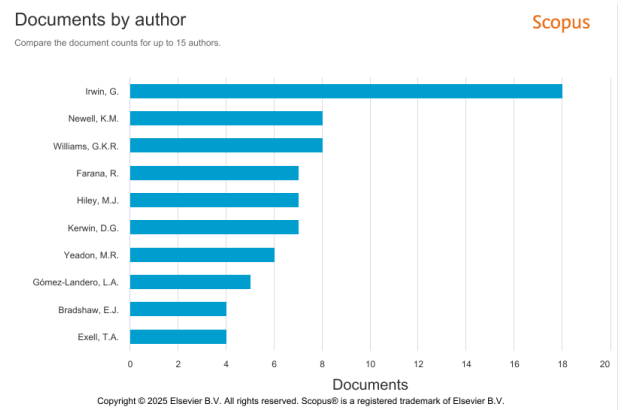


Fig. 4. Top 10 most productive authors publishing on gymnastics in physical education (2015–2025). Source: Scopus database (analyzed on October 29, 2025)

As illustrated in Figure 4, Irwin, G. emerges as the most productive author, contributing 18 publications related to gymnastics and physical education during the 2015–2025 period. His works predominantly focus on the biomechanics of gymnastics performance, skill acquisition, and applied motor control in educational contexts. Following closely are Newell, K. M. and Williams, G. K. R., each with 10 publications, both recognized for their influential research on motor learning and coordination within sports and exercise science.

Other prominent contributors include Farana, R., Hiley, M. J., and Kerwin, D. G., each with 7–8 publications. Their studies primarily examine the mechanical and physiological

aspects of gymnastics performance, offering insights into balance, motion dynamics, and performance efficiency. Similarly, Yeadon, M. R. has made notable contributions with 7 publications, focusing on biomechanical modeling and movement optimization in gymnastics training.

Additionally, researchers such as Gómez-Landero, L. A., Bradshaw, E. J., and Exell, T. A. where each of them have 4–5 publications, represent emerging contributors in the field, often exploring interdisciplinary intersections between sport performance, physical education pedagogy, and applied human movement science.

The data indicate that the majority of prolific authors are affiliated with institutions in the United Kingdom, Australia, and Spain, reflecting strong international representation. This suggests that gymnastics-related research within physical education is primarily driven by scholars specializing in biomechanics, motor learning, and sport performance, underscoring the technical and scientific dimensions of the discipline.

Analysis of Documents by Affiliation

Institutional productivity analysis provides an overview of universities and research centers that have contributed most significantly to the study of gymnastics in physical education. This indicator reflects the concentration of expertise, research collaboration, and the institutional support that sustains scientific output in the field.

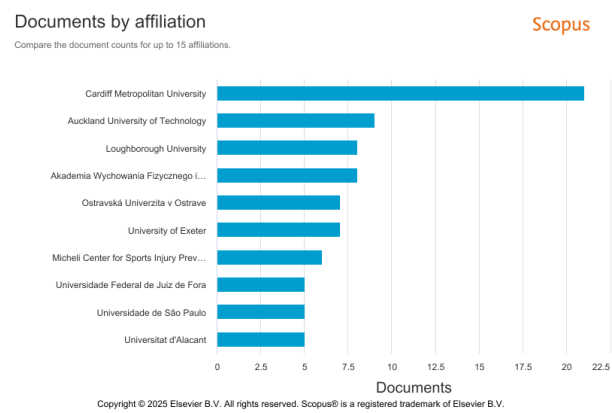


Fig. 5. Top 10 affiliations contributing to publications on gymnastics in physical education (2015–2025). Source: Scopus database (analyzed on October 29, 2025)

As presented in Figure 5, Cardiff Metropolitan University ranks as the most productive institution, with approximately 21 publications on gymnastics and physical education between 2015 and 2025. The university's dominance in this area is consistent with its reputation for excellence in sport and exercise science research, as well as its strong focus on applied biomechanics and motor learning.

Following Cardiff Metropolitan University, the Auckland University of Technology and Loughborough University both exhibit notable research activity, each contributing around 8 publications. These institutions are recognized for their interdisciplinary approach, combining physical education pedagogy, human performance analysis, and sports technology innovation. Similarly, the Akademia Wychowania Fizycznego im. Jerzego Kukuczki

w Katowicach (Poland) and Ostravská Univerzita v Ostravě (Czech Republic) also appear as active contributors, each producing approximately 7 publications, indicating the growing presence of Central European research in this domain.

The University of Exeter and Micheli Center for Sports Injury Prevention show moderate productivity with around 6 publications each, emphasizing the role of British and American institutions in advancing gymnastics injury prevention and performance assessment studies. Meanwhile, Latin American representation is reflected by the Universidade Federal de Juiz de Fora and Universidade de São Paulo (Brazil), both contributing five to six documents, demonstrating the increasing research engagement from South American universities. Additionally, Universitat d'Alacant (Spain) contributes a comparable number of publications, further supporting Spain's strong involvement in gymnastics-related pedagogy and physical education research.

The overall pattern suggests that institutional research productivity is largely concentrated in universities with established sport science and physical education programs. European institutions dominate the top rankings, followed by growing participation from Oceania and South America. This distribution indicates a globally interconnected research community, with potential for expanded collaboration across regions to advance innovation in gymnastics education and movement science.

Analysis of Documents by Subject Area

The subject area distribution provides an overview of the disciplinary scope of publications on gymnastics in physical education. This analysis reflects the multidisciplinary nature of the field, which bridges sport science, health, psychology, and education.

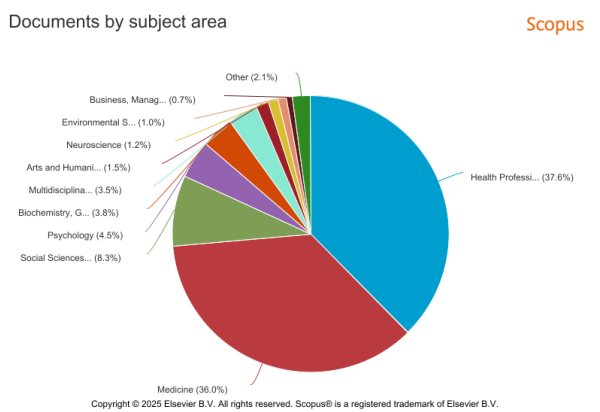


Fig. 6. Annual Distribution of Publications on Gymnastics in Physical Education (2015–2025). Source: Scopus database (analyzed on October 29, 2025)

As displayed in Figure 6, the Health Professions category represents the largest proportion of publications, accounting for 37.6% of all documents. This dominance indicates that research on gymnastics is strongly associated with health promotion, physical performance, and sports training studies. The Medicine category follows closely with 36.0%, highlighting the strong clinical and physiological focus of

many publications, particularly those investigating injury prevention, physical fitness, and rehabilitation in gymnastics and physical education contexts.

The Social Sciences area contributes 8.3% of total documents, underscoring the importance of pedagogical, sociocultural, and educational perspectives in gymnastics-related research. This proportion suggests that scholars increasingly view gymnastics not only as a sport but also as a medium for fostering learning, motivation, and holistic development in educational settings. The Psychology category, comprising 4.5% of the publications, further emphasizes the field's attention to motivation, cognitive processes, and the psychological dimensions of motor learning and skill acquisition.

Smaller but notable contributions come from Biochemistry, Genetics, and Molecular Biology (3.8%), Multidisciplinary (3.5%), and Arts and Humanities (1.5%), which together indicate the integration of scientific, cross-disciplinary, and creative approaches in gymnastics research. Additionally, minor contributions are recorded in Neuroscience (1.2%), Environmental Science (1.0%), and Business, Management and Accounting (0.7%), as well as Other (2.1%), showing that gymnastics-related studies occasionally intersect with diverse research fields such as environmental adaptation, sports administration, and performance optimization.

Generally, the subject area distribution demonstrates that the study of gymnastics in physical education is inherently multidisciplinary, combining biomedical, pedagogical, and psychological dimensions. The predominance of Health Professions and Medicine reflects a sustained research focus on performance, injury prevention, and athlete health, while the growing representation of Social Sciences and Psychology points to the expanding educational and behavioral research directions in this domain.

Keyword Co-Occurrence Network

To identify the conceptual structure and thematic focus of research on gymnastics in physical education, a keyword co-occurrence analysis was conducted using VOSviewer (version 1.6.20). Only keywords with a minimum occurrence of five were included in the visualization to ensure the reliability and clarity of thematic clusters. The analysis revealed several interconnected keyword networks that represent dominant and emerging themes in the field.

The resulting network map (Figure 7) displays multiple clusters differentiated by color, each representing a distinct thematic domain. The first cluster (red) centers on gymnastics, physical education, and teaching, which form the core concepts of the research domain. Keywords such as students, learning outcomes, and pedagogy frequently co-occur, emphasizing the educational dimension of gymnastics in school-based physical education.

The second cluster (green) focuses on motor learning, movement, coordination, and balance. This cluster reflects research that examines the physiological and biomechanical aspects of gymnastics, especially in relation to fundamental movement skills and body control. These studies typically explore how gymnastics contributes to the development of psychomotor competence and postural stability.

The third cluster (blue) represents topics related to injury prevention, biomechanics, and performance. This cluster

Keyword Network Visualization (Based on VOSviewer-style Clustering)

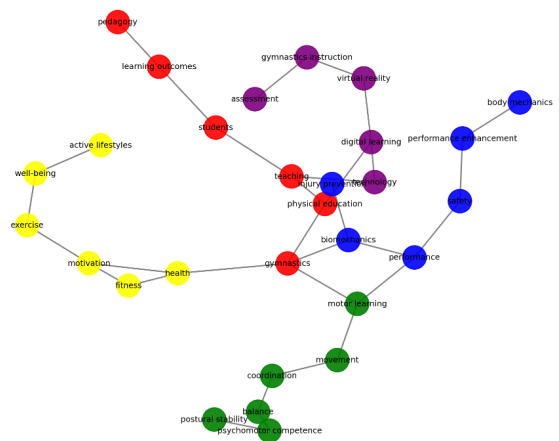


Fig. 7. Keyword co-occurrence network map of research on gymnastics in physical education (minimum 5 occurrences). Source: Scopus database (analyzed on October 29, 2025)

shows the influence of sport science and medical research within the domain, often emphasizing safety, performance enhancement, and body mechanics in gymnastics practice.

The fourth cluster (yellow) includes keywords such as health, fitness, motivation, and exercise, indicating an emerging trend toward health-oriented and motivational studies. These publications often connect gymnastics education with well-being, student engagement, and the promotion of active lifestyles.

Finally, a smaller fifth cluster (purple) relates to technology, digital learning, and virtual reality, which represents a relatively new research direction exploring how digital tools can enhance gymnastics instruction and assessment in physical education contexts.

The density visualization of keywords shows that the terms gymnastics, physical education, motor learning, and health are the most central and frequently connected nodes, indicating their strong influence in shaping the overall research landscape. These findings demonstrate that while biomechanics and health sciences remain dominant, there is growing attention to educational innovation, inclusive practices, and digital pedagogy in gymnastics learning.

Discussion

The bibliometric analysis conducted in this study provides a comprehensive overview of the research landscape on gymnastics in physical education from 2015 to 2025, as indexed in the Scopus database. The findings reveal evolving publication trends, highlight key contributing countries, institutions, and authors, and shed light on the thematic development of the field through keyword co-occurrence analysis.

Moreover, this bibliometric analysis provides an interpretive synthesis of how gymnastics research has been framed and developed within the field of physical education over the past decade. Rather than treating gymnastics research as a homogeneous body of knowledge, the discussion explicitly differentiates pedagogical physical education contexts from elite or competitive sport-oriented

scholarship. This distinction is essential, as physical education is a curriculum-based educational domain focused on learning processes, motor development, and pedagogical outcomes, whereas elite gymnastics research primarily emphasizes performance optimization and biomedical efficiency (Krüger, 2018; Robinson et al., 2020).

Publication Trends and Research Growth

The annual distribution of publications shows a fluctuating yet dynamic pattern, with a notable peak in 2019 followed by a decline after 2021. This fluctuation may reflect broader global circumstances such as the COVID-19 pandemic, which disrupted physical education activities and sports research worldwide (Li et al., 2022). However, the rebound observed in 2025 indicates a renewed academic interest in promoting physical literacy and re-integrating gymnastics into post-pandemic physical education curricula. The long-term trend suggests that gymnastics continues to be a relevant topic due to its role in developing students' motor skills, coordination, and overall physical fitness (Molina, 2015; Raid et al., 2022; Rudd et al., 2017; Sabau et al., 2023).

Gymnastics Research within a Pedagogical Physical Education Context

Although the publication landscape is dominated by sport science, biomechanics, and health-related journals, the thematic patterns identified through keyword co-occurrence analysis indicate that a substantial proportion of studies address pedagogically relevant constructs such as motor learning, movement coordination, instructional strategies, and student development. This finding reflects a well-documented characteristic of physical education research, in which pedagogical inquiries are frequently disseminated through sport science outlets due to their methodological orientation and analytical consistency (McVeigh et al., 2025).

Importantly, the disciplinary categorization of journals should not be equated with research purpose. Studies published in biomechanics or human movement journals often investigate learning-related variables that directly inform physical education practice, particularly in gymnastics where movement quality, control, and adaptability are central educational goals (Abdollahipour et al., 2015). Therefore, the bibliometric evidence supports the interpretation that gymnastics research contributes meaningfully to pedagogical PE, even when disseminated outside traditionally educational journals.

Implications for Physical Education Curriculum Design

The prominence of thematic clusters related to motor learning, balance, coordination, and fundamental movement skills reinforces the role of gymnastics as a foundational curricular component in physical education. Gymnastics-based activities emphasize whole-body control, spatial awareness, and movement variability, which are core elements of physical literacy and transferable across multiple physical activity contexts (Molina, 2015; Rudd et al., 2017).

The bibliometric trends further suggest a pedagogical shift from rigid, technique-centered instruction toward

more inclusive and developmentally appropriate curriculum models. Research addressing creativity, exploration, and task variability aligns with contemporary PE curricula that prioritize learner diversity and progressive skill development rather than standardized performance benchmarks (Lindsay & Spittle, 2024). In this sense, gymnastics functions not merely as a sport-specific content area, but as a curricular vehicle for fostering broad movement competence in school and higher education PE.

Relevance for Teacher Education and Pedagogical Practice

The concentration of influential publications and productive institutions within sport science-oriented universities highlights an important implication for physical education teacher education. While biomechanical and motor control research provides a robust evidence base, its pedagogical translation is not always explicit. The findings of this study indicate a growing need for teacher education programs to contextualize scientific knowledge within pedagogical frameworks that support instructional decision-making in PE settings (Robinson et al., 2020).

The presence of themes related to teaching strategies, learning environments, and student-centered instruction suggests that gymnastics research increasingly addresses how learning is facilitated, not solely how movements are executed. This trend is particularly relevant for pre-service and in-service PE teachers, who often report limited confidence in teaching gymnastics due to safety concerns and perceived technical complexity (McVeigh et al., 2025). By highlighting pedagogically oriented research clusters, this bibliometric analysis supports the development of pedagogical content knowledge and reinforces gymnastics as a meaningful component of teacher education curricula.

Gymnastics, Motor Development, and Fundamental Movement Skills

The strong representation of motor learning and coordination themes underscores gymnastics as a critical medium for fundamental movement skill (FMS) development in physical education. Unlike specialized sports that emphasize early specialization, gymnastics prioritizes movement diversity, body control, and adaptability, which are essential for motor competence across developmental stages (Raid et al., 2022; Rudd et al., 2017).

The bibliometric patterns indicate that gymnastics research increasingly foregrounds developmental and educational outcomes rather than elite performance indicators. This supports the positioning of gymnastics as a pedagogical tool for enhancing movement quality and motor confidence, which are central objectives in contemporary PE curricula. Consequently, gymnastics-based instruction contributes not only to physical skill acquisition but also to students' readiness for lifelong participation in physical activity.

Pedagogical Models and Emerging Educational Directions

The emergence of technology-related and motivation-oriented themes reflects broader pedagogical transformations within physical education. Digital

tools such as motion analysis, virtual feedback systems, and technology-supported assessment have expanded instructional possibilities in gymnastics, enabling more individualized and formative learning experiences (Jastrow et al., 2022). These developments align with learner-centered pedagogical models that emphasize autonomy, feedback, and engagement.

In addition, the increasing focus on health and motivation suggests that gymnastics research is responding to contemporary educational priorities, including well-being, inclusivity, and sustained physical activity participation. Rather than reinforcing performance-driven or exclusionary practices, the thematic evolution identified in this study indicates a gradual alignment with inclusive and health-oriented pedagogical models in physical education (Kojima et al., 2021).

Scientific and Pedagogical Added Value of the Bibliometric Analysis

From a scientific perspective, this study contributes by systematically mapping the intellectual structure of gymnastics research within physical education and clarifying its conceptual orientation. By distinguishing pedagogically relevant PE research from elite sport-focused scholarship, the analysis addresses a critical ambiguity in the literature and strengthens the theoretical coherence of gymnastics as a research domain in PE (Donthu et al., 2021).

From a pedagogical standpoint, the bibliometric findings provide evidence-based insights that are directly applicable to curriculum development, teacher education, and instructional innovation. The identification of dominant and emerging themes offers guidance for future research agendas and supports reflective decision-making among educators and policymakers. Thus, this study demonstrates that bibliometric analysis can function not only as a descriptive tool but also as a methodological approach for advancing pedagogical understanding and practice in physical education.

Conclusions

This study provides an analytical overview of how gymnastics research has been positioned and developed within the field of physical education over the last decade. Rather than merely documenting publication output, the bibliometric approach employed in this study reveals the intellectual structure and thematic orientations that have shaped gymnastics-related scholarship in educational contexts. The findings demonstrate that gymnastics research in physical education has progressively expanded beyond performance-centered perspectives toward more pedagogically oriented, interdisciplinary, and educationally relevant frameworks.

From an analytical standpoint, this study contributes by clarifying the conceptual landscape of gymnastics research in physical education and distinguishing it from elite or competitive sport-oriented scholarship. The identification of dominant thematic clusters—particularly those related to pedagogy, motor learning, health, and technology—illustrates how gymnastics functions as a curricular content area that supports learning processes, physical literacy, and student development. By mapping these clusters, the study highlights

both well-established research domains and emerging areas that warrant further scholarly attention within PE.

From a pedagogical perspective, the findings underscore the educational value of gymnastics as a medium for developing fundamental movement skills, motor coordination, and learner engagement in physical education settings. The prominence of pedagogical and motor learning themes suggests that gymnastics remains a relevant and adaptable component of contemporary PE curricula, particularly when aligned with inclusive, student-centered, and competence-based teaching approaches. Furthermore, the growing presence of technology-related themes indicates increasing opportunities for innovation in gymnastics instruction, assessment, and teacher education.

Importantly, this study offers implications for curriculum design and teacher education by providing evidence-based insights into how gymnastics research aligns with current educational priorities. By identifying research concentrations and gaps, the findings can support educators and policymakers in making informed decisions regarding the integration of gymnastics into PE programs, professional development initiatives, and pedagogical model selection.

In conclusion, this bibliometric analysis contributes to physical education theory and methodology by repositioning gymnastics as an educationally grounded and pedagogically meaningful research domain. Future research should build upon these insights by examining how identified themes are operationalized in classroom practice, exploring pedagogical models that effectively integrate gymnastics into PE curricula, and expanding cross-disciplinary and international collaboration to strengthen the educational impact of gymnastics research.

Ethical Considerations

This study utilized secondary data from publicly available databases and did not involve any human participants, so ethical approval was not necessary. Nevertheless, the data were managed with care, and the original sources were properly cited to uphold academic integrity standards.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Data Availability Statement

The bibliometric dataset analyzed in this study was retrieved from the Scopus database on October 29, 2025, using the search strategy described in the Methods section. Due to Scopus licensing restrictions, the raw data cannot be publicly shared. However, the extracted bibliographic information and processed dataset supporting the findings of this study are available from the corresponding author upon reasonable request and in accordance with database access policies.

Funding

This research received no external funding from public, commercial, or non-profit organizations. All research

activities, including data access, analysis, and manuscript preparation, were fully supported by the authors through independent and self-funded resources.

AI Transparency Statement

No artificial intelligence tools were used in the processes of data collection, screening, bibliometric analysis, or interpretation of the findings. All methodological decisions, analytical procedures, and conceptual interpretations were conducted independently by the authors to ensure scientific rigor and intellectual accountability. AI-assisted tools were utilized solely for language refinement and minor editorial support to improve clarity and readability of the manuscript, without influencing the research design, data analysis, results, or conclusions presented in this study.

References

- Sawicki, P., Dornowski, M., Grzywacz, T., & Kaczor, J.J. (2018). The effects of gymnastics training on selected parameters of anaerobic capacity in 12-year-old boys. *Journal of Sports Medicine and Physical Fitness*, 58(5), 591-596. <https://doi.org/10.23736/S0022-4707.17.06778-0>
- Viciene, R.A., Zaičėnkoviene, K., Stasiulė, L., & Stasiulis, A. (2015). Physiological responses and energetics of competitive group exercise in female aerobic gymnasts with different levels of performance. *Perceptual and Motor Skills*, 120(3), 787-803. <https://doi.org/10.2466/29.26.PMS.120v15x7>
- Krüger, M. (2018). Gymnastics, physical education, sport, and Christianity in Germany. *International Journal of the History of Sport*, 35(1), 9-26. <https://doi.org/10.1080/09523367.2018.1496084>
- Bertills, K., & Björk, M. (2024). Facilitating regular physical education for students with disability-PE teachers' views. *Frontiers in Sports and Active Living*, 6, 1-11. <https://doi.org/10.3389/fspor.2024.1400192>
- Lindsay, R., & Spittle, M. (2024). The adaptable coach - A critical review of the practical implications for traditional and constraints-led approaches in sport coaching. *International Journal of Sports Science and Coaching*, 19(3), 1240-1254. <https://doi.org/10.1177/17479541241240853>
- Abdollahipour, R., Wulf, G., Psotta, R., & Palomo-Nieto, M. (2015). Performance of gymnastics skill benefits from an external focus of attention. *Journal of Sports Sciences*, 33(17), 1807-1813. <https://doi.org/10.1080/02640414.2015.1012102>
- Changstrom, B.G., Brou, L., Khodae, M., Braund, C., & Comstock, R.D. (2015). Epidemiology of stress fracture injuries among US high school athletes, 2005-2006 through 2012-2013. *American Journal of Sports Medicine*, 43(1), 26-33. <https://doi.org/10.1177/0363546514562739>
- Harris, J., & Cale, L. (2018). *Promoting active lifestyles in schools*. Human Kinetics. <https://doi.org/10.5040/9781718215542>
- Jastrow, F., Greve, S., Thumel, M., Diekhoff, H., & Süßenbach, J. (2022). Digital technology in physical education: A systematic review of research from 2009 to 2020. *German Journal of Exercise and Sport Research*, 52(4), 504-528. <https://doi.org/10.1007/s12662-022-00848-5>
- Leite, I., Fonseca, P., Carvalho, L.Á., Vilas-Boas, J.P., Goethel, M., Mochizuki, L., & Conceição, F. (2023). The state of the art in acrobatic gymnastics: A bibliometric analysis. *Science of Gymnastics Journal*, 15(1), 47-63. <https://doi.org/10.52165/sgj.15.1.47-63>
- Rahayu, N. I., Muktiarni, M., Husaeni, D. F. Al, & Ismail, A. (2023). Bibliometric analysis of revolutionizing physical activity: Challenges and potentials of emerging technologies. *International Journal of Research and Applied Technology*, 3(2), 366-378. <https://doi.org/10.34010/injuratech.v3i2.14791>
- Avila-Garzon, C., & Bacca-Acosta, J. (2021). Augmented reality in education: An overview of twenty-five years of research. *Contemporary Educational Technology*, 13(3). <https://doi.org/10.30935/cedtech/10865>
- Silva, M.R. G., & Paiva, T. (2015). Low energy availability and low body fat of female gymnasts before an international competition. *European Journal of Sport Science*, 15(7), 591-599. <https://doi.org/10.1080/17461391.2014.969323>
- Bonanno, J., Cheng, J., Tilley, D., Abutalib, Z., & Casey, E. (2022). Factors associated with Achilles tendon rupture in women's collegiate gymnastics. *Sports Health*, 14(3), 358-368. <https://doi.org/10.1177/19417381211034510>
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W.M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285-296. <https://doi.org/10.1016/j.jbusres.2021.04.070>
- Baas, J., Schotten, M., Plume, A., Côté, G., & Karimi, R. (2020). Scopus as a curated, high-quality bibliometric data source for academic research in quantitative science studies. *Quantitative Science Studies*. https://doi.org/10.1162/qss_a_00019
- Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71. <https://doi.org/10.1136/bmj.n71>
- Aria, M., & Cuccurullo, C. (2017). Bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959-975. <https://doi.org/10.1016/j.joi.2017.08.007>
- Bus, R.D. J.D. (2023). *VOSviewer: Putting research into context*. <https://doi.org/10.21428/a1847950.acdc99d6>
- Jan, N., & Van Eck, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84, 523-538. <https://doi.org/10.1007/s11192-009-0146-3>
- Robinson, D.B., Randall, L., & Andrews, E. (2020). Physical education teachers' (lack of) gymnastics instruction: An exploration of a neglected curriculum requirement. *Curriculum Studies in Health and Physical Education*, 11(1), 67-82. <https://doi.org/10.1080/25742981.2020.1715232>
- Li, J.T., Arizmendi, G.D., & Swanson, H.L. (2022). The role of language comprehension skills and instructional practices in cross-language influence of Spanish-speaking dual language learners' calculation skills. *Early Childhood Research Quarterly*, 61, 90-105. <https://doi.org/10.1016/j.jecresq.2022.05.004>
- Molina, G.M. (2015). The educational relevance of gymnastics skills: Teachers' appraisals. *Apunts. Educación Física y Deportes*, 121(3), 28-35. [https://doi.org/10.5672/apunts.2014-0983.es.\(2015/3\).121.04](https://doi.org/10.5672/apunts.2014-0983.es.(2015/3).121.04)
- Raid, M.R., Nikola, A., Bojan, B., Izet, K., & Benin, M. (2022). The influence of sports gymnastics on the motor skills of

- male students. *Scientific Journal of Education, Sports, and Health*, 23(2), 61-73. <https://doi.org/10.29081/gsjesh.2022.23.2.04>
- Rudd, J.R., Barnett, L.M., Farrow, D., Berry, J., Borkoles, E., & Polman, R. (2017). The impact of gymnastics on children's physical self-concept and movement skill development in primary schools. *Measurement in Physical Education and Exercise Science*. <https://doi.org/10.1080/1091367X.2016.1273225>
- Sabau, A.M., Savescu, B., Bulz, C., Damian, M., & Savescu, D. (2023). Development study determining motor qualities in rhythmic gymnastics. *GeoSport for Society*, 19(2), 65-75. <https://doi.org/10.30892/gss.1903-097>
- McVeigh, J., Maher, A.J., Thomson, A., & Knight, J. (2025). Physical education teacher education: Disrupting ableism in gymnastics. *Sport, Education and Society*. <https://doi.org/10.1080/13573322.2025.2511987>
- Kojima, M., Kinomura, Y., & Kuzuhara, K. (2021). Development of observational indicators for evaluating handstand posture in the mat exercise in physical education class: Validity and reliability. *Journal of Physical Education and Sport*, 21, 2087-2096. <https://doi.org/10.7752/jpes.2021.s3266>

Глобальні тенденції досліджень гімнастики у фізичному вихованні: бібліометричний аналіз за даними Scopus

Люсі Октавані^{1ABCD}, Марсіка Сеп'янда^{1ABCD}, Ріна Маянґсарі^{1BCD}

¹Державний університет Паданґа

Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; Е – збір коштів

Реферат. Стаття: 12 с., 2 табл., 7 рис., 28 джерел.

Мета дослідження – з'ясувати глобальні тенденції наукових досліджень з гімнастики у фізичному вихованні на основі бібліометричного аналізу документів, індексованих у базі даних Scopus у 2015–2025 роках.

Матеріали і методи. Дані отримано за ключовими словами «gymnastics» та «physical education» з подальшою фільтрацією за типом документів (статті та огляди) і мовою публікацій (англійська). Загалом проаналізовано 297 документів. Для візуалізації взаємозв'язків співзвучності ключових слів використано програмне забезпечення VOSviewer.

Результати. Установлено коливальну динаміку публікацій із піком у 2019 році та подальшим зниженням після 2021 року, що може бути пов'язано з тимчасовим змищенням дослідницької активності в період пандемії COVID-19. Найбільш продуктивними країнами визначено Сполучені Штати Америки, Велику Британію та Іспанію. Серед установ-лідерів виділено Cardiff Metropolitan University та Loughborough University. Картування співзвучності ключових слів дало змогу виокремити п'ять основних тематичних кластерів: (1) педагогіка гімнастики та навчання студентів; (2) моторне навчання та координація рухів; (3) біомеханіка та профілактика травм; (4) здоров'я, мотивація та фізична активність; (5) технологічно підтримане фізичне виховання.

Висновки. Результати свідчать, що дослідження гімнастики у фізичному вихованні еволюціонували від переважно біомеханічної та результат-орієнтованої перспективи до більш міждисциплінарного підходу, який інтегрує аспекти здоров'я, освіти та технологій. Результати дослідження можуть бути використані дослідниками, викладачами та робітниками освітньої політики для розвитку співпраці, інтеграції цифрових інструментів навчання та впровадження інноваційних педагогічних практик у навчанні гімнастики.

Ключові слова: гімнастика, фізичне виховання, бібліометричний аналіз, Scopus, наукові тенденції.

Information about the authors:

Oktavani, Lucy: lucyoktavani88@unp.ac.id; <https://orcid.org/0000-0002-2519-2542>; Department of Physical Education, Faculty of Sports Science, Universitas Negeri Padang, Hamka Street, Air Tawar Barat, Padang, West Sumatera, 25133, Indonesia

Sepyanda, Marsika: marsikayanda@unp.ac.id; <https://orcid.org/0000-0002-8149-2267>; Department of Health and Recreation, Faculty of Sports Science, Universitas Negeri Padang, Hamka Street, Air Tawar Barat, Padang, West Sumatera, 25133, Indonesia

Mayangsari, Rina: rinamayangsari@unp.ac.id; <https://orcid.org/0000-0002-7786-1541>; Department of Health and Recreation, Faculty of Sports Science, Universitas Negeri Padang, Hamka Street, Air Tawar Barat, Padang, West Sumatera, 25133, Indonesia

Cite this article as: Oktavani, L., Sepyanda, M., & Mayangsari, R. (2026). Global Research Trends on Gymnastics in Physical Education: A Scopus-Based Bibliometric Analysis. *Physical Education Theory and Methodology*, 26(2), 272-283. <https://doi.org/10.17309/tmfv.2026.2.05>

Received: 05.11.2025. Accepted: 18.02.2026. Published: 30.03.2026

This work is licensed under a Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0>)