Journal of Physical Education and Sport Pedagogy

Journal homepage: *https://ejournal.upi.edu/index.php/JPESP/index*

Bibliometric Analysis: Trends in Research on Physical activity to Enhance Student Motivation in Physical Education

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ABSTRACTS

The post-pandemic period has increased research on the role of physical activity in improving student motivation in Physical Education (PE). However, a comprehensive mapping of this research remains limited. This study aims to identify publication trends, key themes, and research gaps related to physical activity and student motivation in PE. A bibliometric analysis was conducted using 1,871 articles indexed in the Scopus database from 2020 to 2026. Data were analyzed using the Bibliometrix package (Biblioshiny) in RStudio, focusing on publication growth, source impact, country contribution, and conceptual structure. The results show an annual growth rate of 3.79%, with a peak in 2024–2025 reaching 599 publications. Frontiers in Psychology is the most productive source, while China and the United States lead citation impact. Conceptual mapping highlights strong relationships among motivation, physical activity, self-efficacy, and self-determination theory. The trend also shows a shift toward integrating psychological well-being into physical activity research. These findings confirm the importance of physical activity based on self-determination theory in enhancing student motivation. However, empirical studies at the elementary level remain limited. Future research should focus on testing practical interventions such as basic movement circuit games.

How to Cite: Dwiwahyudi, D., Herdiansyah, H., & Hambali, B. (2026). Bibliometric analysis: trends in research on physical activity to enhance student motivation in physical education. *Journal of Physical Education and Sport Pedagogy*. 6(1), 7-20.

ARTICLE INFO

Article History:
Received 15 April 2026
Revised 02 May 2026
Accepted 13 May 2026
Available online 13 May 2026

Keywords:
Physical activity; student motivation; physical education; bibliometric analysis; self-determination theory; elementary school

INTRODUCTION

Physical Education (Penjas) plays a fundamental role in the school education curriculum, not only as a means to develop motor skills but also to maintain students' mental health and well-being (Dese & Wibowo, 2025; Khanh et al., 2025; Sheikh et al., 2021; Yang, 2025). In the last decade, active participation in physical activity has been recognized as one of the main determinants of the quality of life and cognitive development of school-aged children (Chen et al., 2020; Hutmacher et al., 2020; Lin et al., 2022). However, the biggest challenge often faced by educators in the field is how to foster and maintain student engagement during the learning process (Burns et al., 2023; Fernández-Bustos et al., 2024; Hao & Yang, 2022).

The key to active participation is motivation. High learning motivation has been proven to positively correlate with self-efficacy and students' academic achievement (Ryan & Deci, 2020). Various previous literatures consistently highlight the importance of Self-determination theory as the main framework for designing physical education learning that can meet students' basic psychological needs, thereby fostering their intrinsic motivation (Cronin et al., 2020). Without adequate motivation, no matter how good the physical activity intervention is, it will not provide optimal long-term impact (Boiché et al., 2020; Papaioannou et al., 2020; Viksi & Tilga, 2022; Yang, 2020).

The landscape of education and physical activity experienced extraordinary disruption due to the COVID-19 pandemic. Physical restrictions during the pandemic raised global issues related to the decline in physical activity levels and the increase in mental health problems among adolescents and children (Castillo et al., 2020; Spittle et al., 2023). In response to this phenomenon, the global scientific community's attention to strategies for restoring students' learning motivation and physical activity has increased exponentially (Hutmacher et al., 2022). This is evidenced by the drastic surge in the production of scientific literature related to this topic in recent years, indicating a high urgency to find more adaptive and attractive physical education learning models in the post-pandemic era (Papastephanou, 2021; Rossi et al., 2021; Verianti & Najib, 2022).

Although studies on motivation, physical activity, and physical education have been extensively conducted and published (Lombardi, 2021), there remains a literature gap in the form of a comprehensive mapping of how these research trends have evolved, especially during the critical period of 2020 to the current recovery phase. Most studies tend to focus on empirical analysis at the micro scale, while macro synthesis that maps topic dynamics, researcher collaboration, and shifts in the focus of physical activity is still very limited (Tendinha

et al., 2021). This mapping is crucial for identifying what forms of physical activity interventions are currently trending and most needed in the future.

Based on this background, this study aims to conduct a bibliometric analysis of global literature trends regarding physical activity in enhancing student motivation in Physical Education. Thru a bibliometric approach, this study will visualize the development map of the literature, identify trending keywords, and highlight research areas that have not been extensively explored. Furthermore, the results of this mapping are expected to provide a strong theoretical foundation for the development of future learning interventions, such as recommendations for the implementation of basic movement circuit games, in order to more effectively and measurably boost the motivation of elementary school students

THEORETICAL FRAMEWORK

This research is based on the Self-Determination Theory (SDT) developed by Deci and Ryan (2000). In the context of Physical Education, SDT emphasizes that students' intrinsic motivation will grow optimally if the learning environment can meet three basic psychological needs: autonomy, competence, and relatedness. Post-pandemic, fulfilling these three needs has become crucial for restoring active student participation in schools. Play-based physical activities, particularly basic movement circuit games, are theoretically the most ideal instruments for operationalizing the principles of SDT among elementary school students. Breaking down movement tasks into circuit stations provides measurable and gradual challenges (enhancing competence). Moreover, the dynamic circuit flow provides space for freedom of movement (autonomy) and often encourages collaboration among students (social bonding). On a macro level, the results of the bibliometric mapping in this study confirm that the current global literature trend heavily relies on the correlation between SDT, physical activity, and motivation. Therefore, this framework concludes that empirical testing of circuit game interventions is the most logical next step to translate these theoretical trends into measurable practical solutions in the classroom..

METHOD

Research Design

This study employed a quantitative descriptive design using bibliometric analysis to systematically map research trends on physical activity and student motivation in Physical Education. Data were retrieved from the Scopus database due to its broad coverage and indexing quality. The search was conducted using a combination of keywords including “physical activity,” “student motivation,” and “physical education,” limited to articles published between 2020 and 2026.

The initial search yielded 1,871 documents. Inclusion criteria consisted of peer-reviewed journal articles written in English and directly related to Physical Education contexts. Documents such as conference papers, book chapters, and non-relevant studies were excluded to ensure data consistency. Data analysis was performed using the Bibliometrix package (Biblioshiny) in RStudio. The analysis included performance analysis (annual publication growth, most productive sources, and country contributions) and science mapping (co-occurrence of keywords, thematic evolution, and conceptual structure). Network visualization techniques were applied to identify relationships among key variables such as motivation, physical activity, self-efficacy, and self-determination theory.

Search and Data Collection Strategy

Secondary data collection was conducted thru literature searches in high-reputation academic databases, namely Scopus. The search strategy was designed using a combination of keywords (search string) derived from the main research variables, utilizing Boolean operators (AND/OR). The main terms used include "physical activity," "motivation," and "physical education," along with relevant synonyms. To maintain the currency and relevance of the data within the context of current educational disruptions, the search period is specifically limited from the year 2020 to the year 2026. In addition, inclusion criteria were applied by filtering only full journal articles (article) to ensure the empirical validity of the analyzed literature. Based on the search protocol, a total of 1,871 article documents that met the criteria for further analysis were successfully extracted.

Data Extraction and Analysis

Figure 1. *Metadata*

The metadata from the 1,871 selected articles were then downloaded and exported into the RStudio software. The overall data computation and visualization process was carried out using the Bibliometrix package thru the Biblioshiny web application interface (Aria &

Cuccurullo, 2017). Data analysis is divided into three main stages. First, performance analysis to evaluate the main information of data collection, including calculating the annual growth rate and the productivity of sources (journals) as well as countries (cited countries). Second, science mapping analysis, which involves the extraction of author's keywords to observe the frequency of concept occurrences. Third, conceptual structure analysis that uses thematic mapping and factor analysis techniques to identify trending topics and the relationships between variables. All the output data is visualized in the form of graphs, tree maps, and word clouds to be interpreted in order to identify research gaps.

RESULTS

Annual Scientific Production

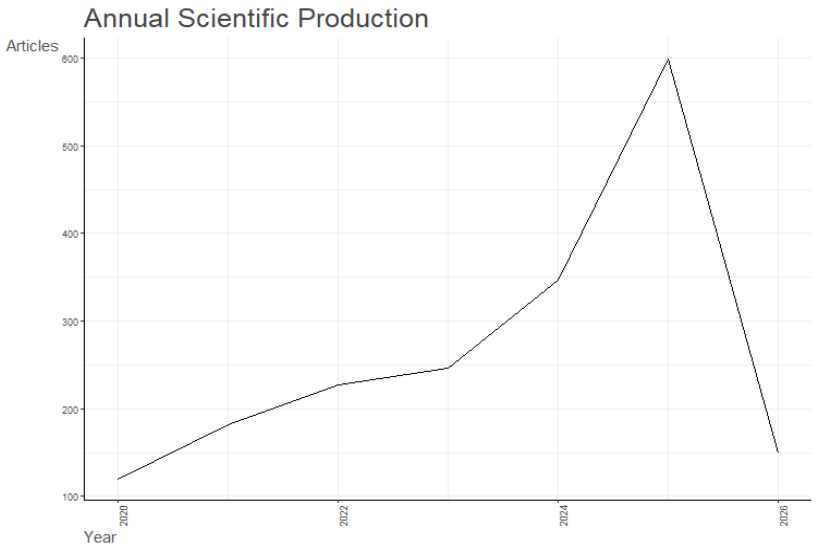

Figure 2. Annual Scientific Production

Based on the data extraction results using RStudio software (Biblioshiny), a total of 1,871 documents published between 2020 and 2026 were found. The data shows a consistent annual increase in the production of scientific publications, with an annual growth rate of 3.79%. At the beginning of the observation period in 2020, the number of publications was recorded at 120 articles, which then steadily increased to 182 articles in 2021, 227 articles in 2022, and 246 articles in 2023. A significant surge in publications occurred exponentially starting in 2024 with 347 articles, peaking in 2025 with a total of 599 articles. The significant surge in scientific literature production over the past two years indicates that the issue of the effectiveness of physical activities in enhancing student motivation in physical education is receiving considerable attention from the global academic community.

Most Relevant Sources & Cited Countries

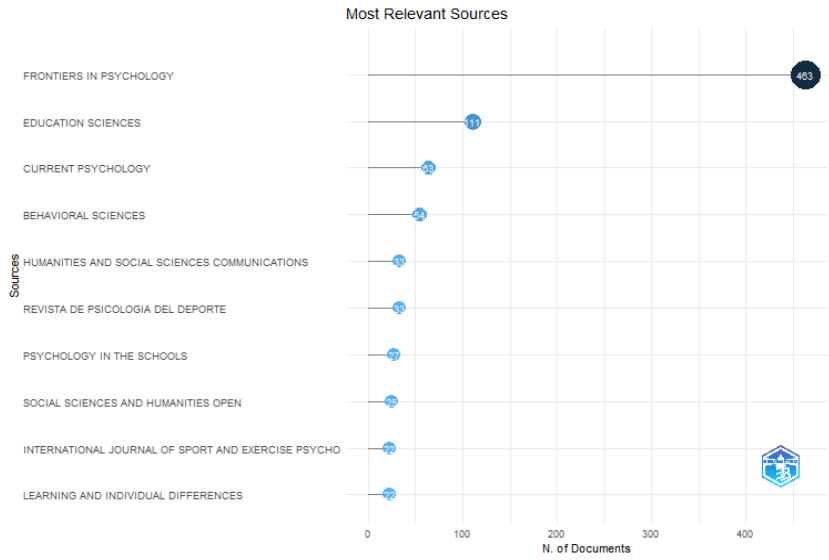

Figure 3. *Most Relevant Sources*

In terms of publication source distribution, the journal Frontiers in Psychology absolutely dominates as the main platform with a total of 463 articles published. This position is followed in order by Education Sciences with 111 articles and Current Psychology with 63 articles. This distribution pattern confirms that research on motivation in physical education is closely linked to the disciplines of psychology and education in general.

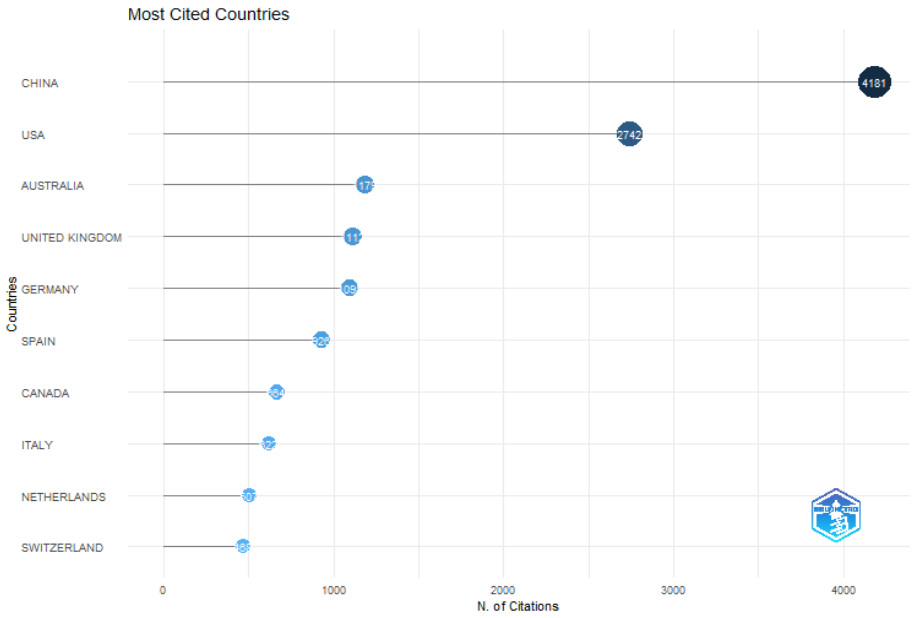

Figure 4. *Cited Countries*

Furthermore, performance analysis based on geographic distribution shows that China has the greatest academic impact, with the highest cumulative citations reaching 4,181 citations. The United States ranks second with 2,742 citations, followed by Australia with 1,179 citations. The high recognition and total citations from these countries represent the significant investment in research they have made toward strategies for psychological well-being recovery and the quality of physical education learning.

Keyword Analysis & Thematic Mapping

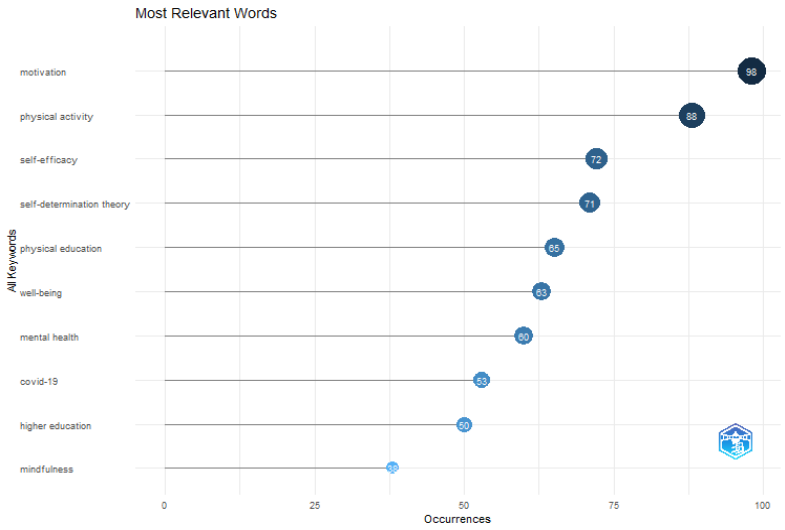

Figure 5. *Keyword Analysis*

Exploration of the keywords (author's keywords) provides a comprehensive overview of the main constructs of the research during this period. The keyword "motivation" topped the list with 98 occurrences, closely followed by "physical activity" with 88 occurrences. Other psychological determinant concepts also dominate the literature, including "self-efficacy" (72 occurrences), "self-determination theory" (71 occurrences), and "physical education" (65 occurrences).

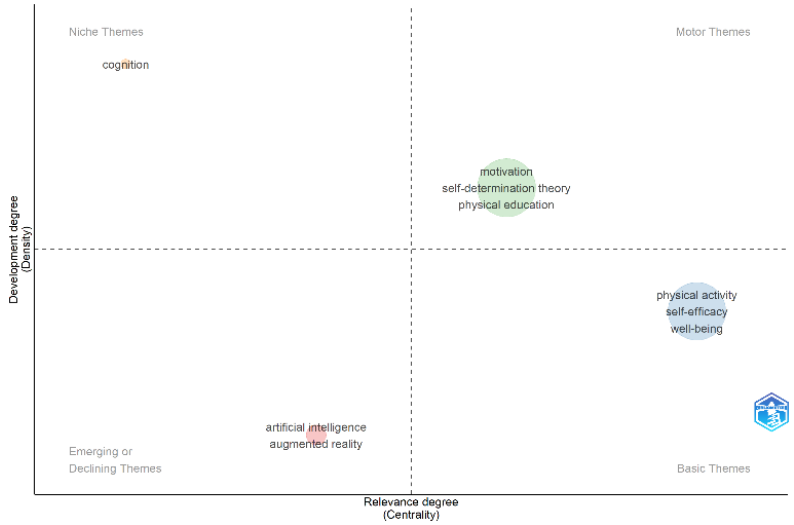

Figure 6. *Thematic Mapping*

Furthermore, the findings from the factor analysis confirm that the variables of motivation, physical activity, self-efficacy, and self-determination theory cluster solidly within the same main cluster. The relationship centered in this single cluster empirically proves that physical activity interventions are crucial in boosting students' learning motivation, which is primarily always based on Self-Determination Theory in the context of physical education.

Trend Topics

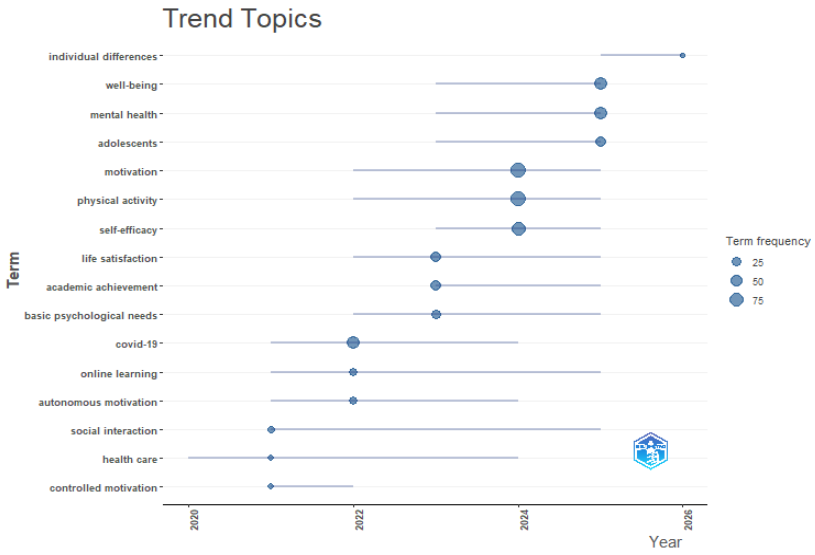

Figure 7. *Trend Topics*

The topic evolution map shows the dynamics and shifts in research focus over time. During the peak of physical restrictions between 2021 and 2022, research trends were strongly focused on the impact of "COVID-19" on the continuity of learning. However, along with the post-pandemic transition phase, this trend has faded and been replaced by a sharp shift in

focus toward recovery issues. Specifically, in the period from 2024 to 2025, the centrality of global research has completely shifted toward efforts to enhance active participation thru crucial topics such as "motivation," "physical activity," "well-being," and "mental health." The fact that the variables of motivation and physical activity are currently at the peak of their maturation trend underscores the urgency for educators and advanced researchers not only to conduct theoretical research but also to start implementing practical movement interventions such as circuit games to address the pressing need to enhance student motivation today.

DISCUSSION

The Urgency of Restoring Motivation Post-Pandemic

The findings related to the extremely exponential surge in publications from 2024 to 2025 (599 articles) represent a highly crucial global phenomenon. Topic dynamics analysis (trend topics) confirms that academic discourse has completely shifted from merely discussing the impact of "COVID-19" restrictions (which peaked in 2021-2022) to the recovery intervention phase, marked by the strengthening of keywords such as well-being, mental health, and motivation. This shift indicates that education and psychology experts worldwide are currently aware of a motivation crisis and a decline in active participation among students due to sedentary habits during the pandemic. Therefore, Physical Education (Penjas) is no longer viewed narrowly as a subject focused solely on mastering sports techniques, but rather as a primary instrument for restoring students' psychological well-being and intrinsic motivation in schools.

The Relationship Between Physical Activity, Motivation, and Self-Determination Theory

The results of the conceptual mapping thru factor analysis and Tree Map prove the existence of a very close structural relationship between motivation, physical activity, self-efficacy, and self-determination theory (SDT) (Cronin et al., 2022a; Hagger et al., 2020; Ntoumanis et al., 2021; Sun et al., 2017; Vasconcellos et al., 2020a). These four variables form a solid conceptual cluster in the literature. This is in line with the basic postulate of Self-Determination Theory, which explains that students' intrinsic motivation will flourish if the learning environment can facilitate three basic psychological needs: competence, autonomy, and relatedness. Well-designed physical activities in Physical Education have been theoretically proven to facilitate all three of these aspects. When students feel capable of performing a physical activity (enhancing self-efficacy), their motivation to continue engaging in learning will automatically increase (Lazarides et al., 2018; Shin & Bolkan, 2021; Vesa Novena et al., 2019).

Research Gap in Motion Intervention Practices

Although global literature has reached a strong theoretical consensus regarding the importance of physical activity on learning motivation, a more in-depth analysis of literature trends reveals a research gap at the practical level. Most of the dominant publications focus on correlational analysis, measurement of psychological constructs, and macro-level theoretical affirmation. On the contrary, the literature that specifically offers structured, practical, and directly implementable movement intervention models for elementary school students is still very limited. A bridge is needed to translate the vast concepts of physical activity and motivation into a form of learning that is real, measurable, and enjoyable for children.

New Direction of Intervention: Relevance of Basic Movement Circuit Games

To fill this practical gap, the trend in literature focusing on motivation points toward the need for a play-based learning approach. Elementary school children have inherent characteristics that are active and enjoy structured challenges. In this context, the intervention model in the form of basic movement circuit games has emerged as a highly potential empirical solution. Circuit games integrate various basic movement stations (locomotor, non-locomotor, and manipulative) into a dynamic sequence. The characteristics of circuit games that provide gradual challenges are very much in line with the principle of competence fulfillment in Self-determination theory (Cronin et al., 2022b; Vasconcellos et al., 2020b). Therefore, testing the effectiveness of this circuit model becomes the next logical step that is urgently needed to convert bibliometric findings into real solutions in Physical Education classes.

Bridging the Bibliometric Trends and Practical Interventions

While the bibliometric mapping robustly confirms the overarching trend of utilizing physical activity to enhance student motivation through the lens of Self-Determination Theory (SDT), it simultaneously exposes a critical practical gap. The dominant keywords heavily revolve around macro-level psychological constructs (e.g., well-being, self-efficacy) rather than specific, replicable pedagogical models. The notable absence of targeted, play-based intervention keywords in the current global trends is not a limitation, but rather underscores an urgent need to translate these theoretical constructs into tangible classroom practices. For elementary school students, play-based and structured physical activities are theoretically proven to best satisfy the basic psychological needs for autonomy and competence. Therefore, introducing a specific empirical model such as basic movement circuit games is not a deviation from the bibliometric findings, but rather a direct and necessary response to the identified literature gap. Circuit games effectively operationalize the highly-cited SDT principles, providing a clear and logical future research direction to bridge the gap between macro-theoretical trends and micro-level pedagogical needs

CONCLUSION

Based on a bibliometric analysis of 1,871 literature documents from the period 2020 to 2026, it can be concluded that research on the utilization of physical activity to enhance motivation in Physical Education has experienced rapid growth, especially in the post-pandemic period (2024-2025). Conceptual mapping confirms that motivation, physical activity, and self-determination theory (SDT) are the main pillars that are inseparable in this academic discourse. There has been a significant shift in trends, where the initial global research focus on the impact of COVID-19 restrictions has now shifted toward efforts to restore psychological well-being, mental health, and strengthen students' self-efficacy. The literature consistently proves that physical activities that facilitate students' basic psychological needs are very effective in boosting learning motivation. However, this literature synthesis also finds a practical gap (research gap), namely the lack of publications offering specific, structured, and game-based movement intervention designs to be directly applied to elementary school students.

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