ISSN : 2527-9580 (print)
ISSN : 2579-7662 (online)

Jendela Olahraga
Volume 10, No. 03, Juli 2025, pp. 325-338
DOI: http://dx.doi.org/10.26877/jo.v10i3.23414

A Decade of Youth Basketball Training Research: Bibliometric Analysis Using VOSviewer and Publish or Perish

Ilham Truly Fajri [a,1,*], Bayu Santoso [a,2], Dito Dwi Cahyo [a,3]

[a] Universitas Pendidikan Indonesia, Jawa Barat, Bandung, 40154, Indonesia
[1] ilhamtrulyfa@upi.edu*; [2] bayufpok@upi.edu; [3] dwicahyodito@upi.edu
* corresponding author

ARTICLE INFO

Article history
Received 2025-06-17
Revised 2025-06-23
Accepted 2025-07-01

Keywords

Bibliometric
Youth Basketball Training
VOSviewer
Publish or Perish

ABSTRACT

This study presents a bibliometric analysis of research trends in youth basketball training published between 2015 and 2025. A total of 111 articles were identified using the Publish or Perish software and Google Scholar database, applying the primary keyword "youth basketball training." Data were analyzed through VOSviewer to map keyword co-occurrence networks, thematic clusters, and collaboration patterns among authors and institutions. The analysis revealed six dominant thematic clusters, including training load, strength and plyometric training, biological maturation, and program implementation. Research output peaked in 2019, declined during the COVID-19 pandemic, and showed a resurgence in 2023–2024. High-frequency keywords such as training, basketball, and youth basketball player indicate the persistent centrality of these themes in the literature. Despite limitations including reliance on a single database and metadata analysis, this study provides a comprehensive overview of the intellectual landscape of youth basketball training research. The findings offer practical insights for coaches and training institutions to develop evidence-based programs tailored to the developmental needs of young athletes. Future studies are recommended to expand database coverage, incorporate psychological and cognitive dimensions of training, and conduct longitudinal analyses to track evolving thematic patterns and their implications for long-term athlete development.

INTRODUCTION

Basketball is among the most popular team sports globally, especially in Europe, as reflected by the high number of registered players. The enthusiasm of the younger generation and active fan communities drives this popularity. In increasingly competitive environments, national sports federations must adopt effective strategies to identify and nurture young talent (Mikołajec et al., 2025). According to Jr. NBA, basketball has one of the highest participation rates among adolescents. Early involvement enhances physical fitness such as muscle strength and cardiorespiratory endurance and supports psychosocial development, including self-confidence and leadership (DiFiori et al., 2018). Participation from a young age also promotes a healthy lifestyle into adulthood.

Several systematic studies have revealed that certain physical attributes play a crucial role in determining the performance of young basketball players. Characteristics such as height, body mass, sprinting speed, agility, and aerobic endurance have been shown to differentiate levels of ability and potential among athletes (Han et al., 2023). Comprehensive fitness measurements, such as the 20-meter

sprint, agility tests, vertical jumps, and mid-distance runs, are utilized to assess physical and technical performance (Mikołajec et al., 2025). Therefore, elements such as speed, explosiveness, and agility become key components in the development of competitive performance for young players.

The differences in physical abilities among age groups are largely influenced by biological maturity levels. For example, U-16 athletes have a significant advantage in anthropometric aspects and jump capacity compared to the U-15 group. Even within the same age group, players with higher biological maturity levels tend to have better height, body mass, and jumping ability compared to their peers (Mikołajec et al., 2025). This is consistent with the findings of Jiménez-Daza et al. (2023), which demonstrate a relationship between biological maturity and muscle strength, as well as vertical jump performance. Recent research further emphasizes the importance of considering biological maturity factors when designing physical training programs for young basketball players. Romero et al. (2021) indicate that plyometric training can enhance physical abilities such as vertical jumping, speed, and aerobic endurance. especially among adolescent girls who have reached a higher level of biological maturity.

Consistent with these findings, a meta-analysis by Jawabreh et al. (2023) indicates that maturation status influences the type of physical superiority among athletes; early-maturing players tend to excel in strength and jumping, while those maturing later have advantages in agility and endurance. This is also supported by the study conducted by Gryko et al. (2022) in Poland, which emphasizes that differences in maturation timing significantly affect the results of physical tests such as sprinting, agility, and vertical jumping in players aged 13 to 15 years. Furthermore, in younger age groups, such as those aged 7 to 9 years, there are significant differences in the mastery of fundamental motor skills (Oktarifaldi et al., 2024). Nevertheless, various studies also indicate that a substantial number of elementary school children still exhibit low levels of competency in fundamental movement skills (FMS), including inadequate basic motor coordination (Brian et al., 2019; Nobre et al., 2018). This fact underscores the necessity for training interventions tailored to the child’s biological maturity stages and motor development needs to optimize the foundation of physical skills for the future. The implications of these findings reinforce the urgency of an individualized approach in the development of young athletes, by tailoring training programs according to each individual's biological development stage.

Systematically designed physical training can accelerate the development of the physical capacities required for basketball. Resistance and plyometric training, for example, have been shown to enhance muscle strength and athletic performance in adolescents (Granacher et al., 2016). Additionally, a nine-week sprint training program can improve vertical jump ability and running speed, although results may vary depending on the players' maturity level (Arede et al., 2022). Adjusting the intensity and volume of training based on biological maturity is also important to prevent excessive fatigue. Arede et al. (2022) emphasize the significance of gradually building players' tolerance to high training loads. This indicates that the design of fitness programs should be tailored individually to optimize the

development of strength and endurance while minimizing the risk of injury and overtraining. In the long term, a varied and comprehensive training approach is more recommended than early sports specialization. The study by Soares et al. (2023) indicates that specialization before puberty does not provide significant benefits to the fitness of young players. Conversely, a combination of training in reaction, speed, and strength has proven to be more effective in enhancing agility compared to single-discipline training (Wang et al., 2024). On the other hand, excessive focus on one sport from an early age can hinder overall motor development and increase the risk of injury (DiFiori et al., 2018). Therefore, early training programs should emphasize the mastery of basic skills as well as the exploration of various physical activities as the foundation for long-term development.

In the context of research, bibliometric analysis has become an important approach to identify the dynamics and trends of research in the field of youth basketball training. The importance of technical skills when identifying and developing athletes with potential has long been recognized by researchers and coaches (Elferink-Gemser et al., 2004; Forsman et al., 2016; Williams et al., 2020). Through this technique, the relationships among authors, institutions, and countries that are active in the production of scientific publications can be systematically mapped. Furthermore, this approach allows for the tracking of dominant research themes, such as physical training, biological maturity, and athletic performance, as well as publications that have a significant impact in the literature. Bibliometric analysis also contributes to identifying gaps in scientific studies, such as the limited longitudinal research or the lack of exploration regarding the effects of exercise based on biological maturity levels. These findings open up opportunities for more focused and impactful subsequent research. In addition, this approach helps map patterns of cross-country and institutional collaboration, which can enhance the quality and diversity of research outcomes, while also providing a theoretical foundation for the development of evidence-based training models.

METHODS

This study adopts a bibliometric analysis approach to thoroughly examine the trends in scientific publications discussing the topics of coaching and physical development in young basketball players over the period from 2015 to 2025. The analysis aims to evaluate the growth of literature, thematic patterns, and the scientific collaboration networks formed in the last decade. Bibliographic data were collected using Publish or Perish software, with the primary database sourced from Google Scholar, selected for its extensive coverage of various types of academic publications across disciplines. The key search terms included phrases such as 'youth basketball training', which are designed to capture relevant articles related to coaching practices for young basketball athletes.

Google Scholar was selected as the primary database for this analysis due to its broad coverage across disciplines, inclusion of grey literature, and compatibility with Publish or Perish software. Unlike Scopus and Web of Science, which index only curated journals, Google Scholar captures a wider spectrum of academic outputs relevant to coaching science, including conference proceedings and

regional journals that are often excluded from commercial databases. This inclusive scope aligns with the aim of capturing diverse research outputs on youth basketball training across global contexts.

Bibliographic data were collected using Publish or Perish (version 8.17.4863.9118 macOS), extracting metadata such as article titles, authorship, affiliations, publication year, citation counts, and journal names. The search query employed key terms such as "youth basketball training" and related synonyms, limited to publications in English and Indonesian from 2015 to 2025. The resulting metadata were processed using VOSviewer (version 1.6.18) to generate bibliometric visualizations. The analyses focused on co-occurrence of keywords, thematic clusters, and author collaboration networks. Only keywords appearing at least X times were included in the co-word analysis to ensure thematic relevance.

Furthermore, the results of this analysis are expected to provide a clear picture of the direction of scientific development in the field of coaching, particularly during the early childhood to adolescent phases. These findings will not only be useful in formulating future research agendas that are more focused and based on practical needs but can also serve as a reference for academics, coaches, and sports policymakers in developing training programs that align with the latest scientific evidence. In addition, mapping collaboration between countries and institutions will reveal the potential for international synergy in the global development of basketball coaching science.

RESULTS AND DISCUSSION

Citation metrics are used to measure publication productivity, the number of citations, and the influence of authors in this field. The table below presents citation matrix information from Google Scholar, illustrating the total publications, citations, and related metrics:

Table 1. Citation Metrics

Source	*Papers*	*Citations*	*Years*	*Cites Year*	*Cites Paper*	*Cites Author*	*Papers Author*	*Authors Paper*	*H index*	*G index*	*Hc index*
Google Scholar	111	1457	10	145.70	13.01	415.76	50.33.00	03.14	19	37	20

Based on the data search using the Publish or Persih application from Google Scholar, various research titles related to the keywords specified by the author were obtained. A total of 111 articles in the form of metadata were gathered, which were then detailed in a Microsoft Excel program with the arrangement of citation, author, title, year, source, publisher, article URL, citation URL, GSRank, QueryDate, Type, DOI, ISSN, CitationURL, volume, issue, StartPage, EndPage, ECC, CitePerYear, CitesPerAuthor, AuthorCount, Age, Abstract, FullTextURL, and RelatedURL. The author presents a table detailing the articles that were previously obtained using the aforementioned applications. Table

2 includes several examples of articles that will be analyzed using the VOSviewer application, where the author selected the 20 best articles with the highest citation count within the period of 2015-2025 that are closely related to the author's keywords. The publication data for youth basketball training can be found in Table 2.

Table 2. 20 Most Cited Articles

Authors	Titles	Years	Citations
D Panchuk, MJ Klusemann, SM Hadlow	Exploring the effectiveness of immersive video for training decision-making capability in elite, youth basketball players	2018	192
OBA Owoeye, LM Palacios-Derflingher	Prevention of ankle sprain injuries in youth soccer and basketball: effectiveness of a neuromuscular training program and examining risk factors	2018	132
C Lupo, A Tessitore, L Gasperi, MAR Gomez	Session-RPE for quantifying the load of different youth basketball training sessions	2017	116
A Gil-Arias, L Garcia-Gonzalez, FDV Alvarez…	Developing sport expertise in youth sport: a decision training program in basketball	2019	107
PF Aschendorf, C Zinner, A Delextrat…	Effects of basketball-specific high-intensity interval training on aerobic performance and physical capacities in youth female basketball players	2019	91
S Hernández, R Ramirez-Campillo…	Effects of plyometric training on neuromuscular performance in youth basketball players: a pilot study on the influence of drill randomization	2018	71
H Moraes, MS Aoki, CG Freitas, AFS Arruda, G Drago…	SIgA response and incidence of upper respiratory tract infections during intensified training in youth basketball players	2017	62
M Cañadas, JS Ibáñez, N Leite	A novice coach's planning of the technical and tactical content of youth basketball training: A case study	2015	58
OBA Owoeye, CA Emery, K Befus…	How much, how often, how well? Adherence to a neuromuscular training warm-up injury prevention program in youth basketball	2020	58
CA Emery, OBA Owoeye, AM Räisänen…	The “shred injuries basketball” neuromuscular training warm-up program reduces ankle and knee injury rates by 36% in youth basketball	2022	55
L Ondra, P Nátěsta, L Bizovská, E Kuboňová…	Effect of in-season neuromuscular and proprioceptive training on postural stability in male youth basketball players	2017	40
D Conte, T Favero, M Niederhausen, L Capranica…	Effect of number of players and maturity on ball-drills training load in youth basketball	2017	39
I Palma-Muñoz, R Ramírez-Campillo…	Effects of progressed and nonprogressed volume-based overload plyometric training on components of physical fitness and body composition variables in youth male basketball players	2021	37
J Sanchez-Sanchez, M Carretero, R Ramirez-Campillo…	Effects of high-intensity training with one versus three changes of direction on youth female basketball players performance	2018	34

ED Zacharakis, DI Bourdas, MI Kotsifa…	Effect of balance and proprioceptive training on balancing and technical skills in 13-14-year-old youth basketball players	2020	33
P Sansone, A Ceravolo…	External, internal, perceived training loads and their relationships in youth basketball players across different positions	2021	30
C Lupo, AN Ungureanu, R Frati…	Player session rating of perceived exertion: a more valid tool than coaches' ratings to monitor internal training load in elite youth female basketball	2019	30
J Arede, TT Freitas, D Johnson, JFT Fernandes…	Training load, maturity timing and future national team selection in national youth basketball players	2022	24
HJ Root, BS Frank, CR Denegar	Application of a preventive training program implementation framework to youth soccer and basketball organizations	2019	21
E Cengizel, ÇÖ Cengizel, E Öz	Effects of 4-month basketball training on speed, agility and jumping in youth basketball players.	2020	19

Development of Articles in the Field of Youth Basketball Training

Figure 1 presents a visual depiction of the dynamics of the number of scientific publications related to youth basketball training published between 2015 and 2025 based on data from Google Scholar. The purpose of this data presentation is to demonstrate the trend in research productivity in this field over the past decade.

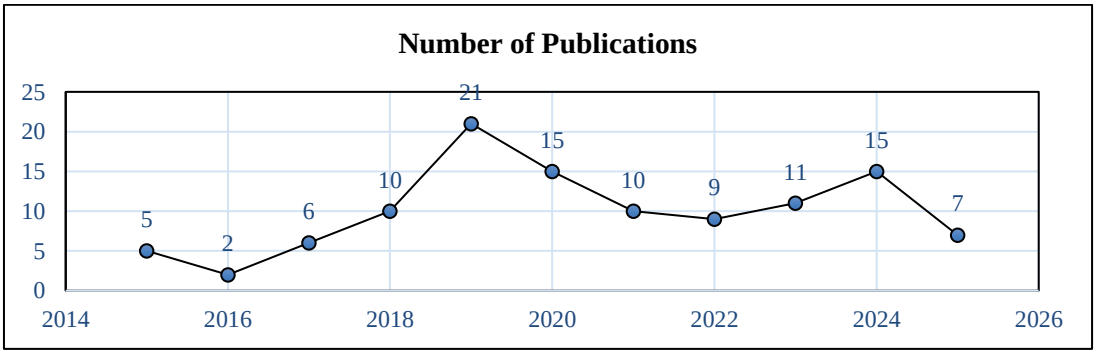

Figure 1. Development Level of Research on Youth Basketball Training

Based on Figure 1, it can be observed that research activities in the topic of basketball coaching among youth age groups exhibit a sufficiently dynamic fluctuation throughout the observation period. Overall, 111 scientific journal articles have been identified that meet the inclusion criteria, with an average scientific production of approximately 11.1 articles per year. In the initial year of observation (2015), five published articles were recorded. This number decreased in 2016 to two articles, but thereafter showed a relatively consistent upward trend. The year 2017 recorded six articles, followed by a significant surge in 2018 with ten articles, and peaked in 2019 with twenty-one articles, which is the highest number in a single year during this period.

Nevertheless, after 2019, there was a decline in the number of publications, with 15 articles in

2020, 10 articles in 2021, and 9 articles in 2022. Despite the decline, the number of publications remained relatively stable and did not show a drastic decrease. Subsequently, the trend experienced an increase again in 2023 with 11 articles, and in 2024, the number of publications rose again to 15 articles. As of 2025, 7 articles have been recorded. It should be noted that because the year 2025 has not fully elapsed, the number of articles for this year is likely to increase over time. This fluctuation reflects the dynamics of interest and scientific attention towards issues related to the development of youth basketball training, which may be influenced by various factors such as national sports policies, global research trends, and an increased awareness of the importance of structured early athlete development. This information is essential for understanding the direction of research development and assisting researchers and practitioners in formulating the priorities for future studies.

Visualization of Youth Basketball Training Articles Using VOSviewer

After the publication data is collected through the Publish or Perish software, the next stage in this research is to conduct bibliometric mapping using the VOSviewer application. The raw data that has been extracted is then uploaded into VOSviewer for computational analysis, specifically to identify the relationships of keywords in scientific publications related to the topics of coaching and physical development in youth basketball. The initial results of the computational process indicate that there are 648 keywords detected from all analyzed publications. However, to maintain the focus of the analysis and relevance to the research objectives, the author filters these keywords and selects the 55 most appropriate and representative ones. This selection process is carried out based on thematic suitability and conceptual relevance to the core issues examined in this research.

Table 3 below presents a structured breakdown of the six clusters identified through VOSviewer keyword co-occurrence analysis. Each cluster contains dominant keywords that represent interconnected research topics in the youth basketball training literature.

Table 3. Thematic Clusters and Key Terms in Youth Basketball Training Research (2015–2025)

Cluster	Color	Thematic Focus	Keywords
1	Red	Training practices and perception	Application, coach, load, paper, perception, player, research, study, training, training load, training session, dan youth basketball training.
2	Green	Physical fitness and training types	Age, athletic performance, basketball player, effect, high intensity interval training, physical fitness, plyometric training, training group, year, youth basketball player, and youth female basketball player.
3	Dark Blue	Performance metrics and sex-specific training	Agility, basketball training, comparison, jumping, physical performance, speed, strength, strength training, youth, and youth male basketball player.

4	Yellow	Program implementation and injury prevention	Adherence, effectiveness, implementation, injury, level, neuromuscular training program, program, programme, and youth basketball.
5	Purple	Expertise development and long-term training	Basketball, basketball youth, decision training program, development, sport expertise, training program, and youth sport.
6	Light Blue	Intervention duration and maturity	Impact, intervention, maturity status, performance, sprint training, and week.

Each cluster demonstrates different thematic focuses that complement each other, reflecting the complexity and diversity of issues examined in studies regarding the training and physical development of young basketball athletes. A detailed visualization of the cluster mapping can be seen in Figure 2, which illustrates the relationships among keywords and thematic distributions in a color-based visual network. This analysis provides a strong foundation for exploring research trends and identifying gaps in the literature that can serve as a basis for further research.

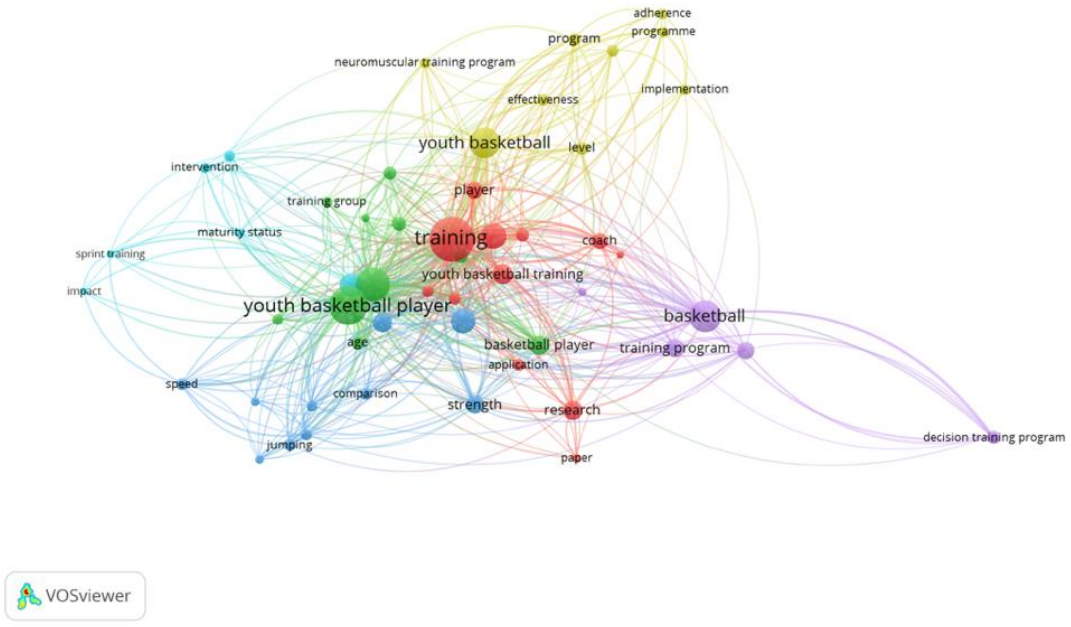

Figure 2. Network Visualization with the Keywords of Youth Basketball Training

Figure 3 presents a visual representation of the relationships among keywords that appear in scientific publications regarding coaching and physical development in young basketball players. In this visualization, the size of the circles indicates the frequency of occurrence of each keyword: the more frequently a keyword appears in the dataset, the larger the size of the circle representing it. Thus, the size of the circle directly reflects the weight or dominance of the topic within the analyzed research landscape.

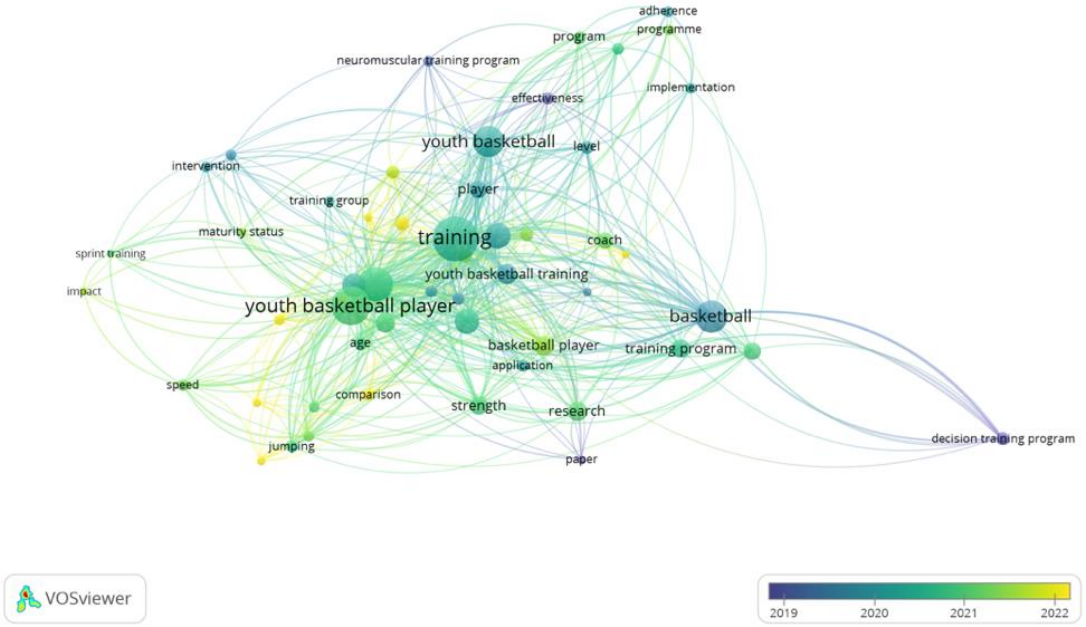

Figure 3. Overlay Visualization with Keywords of Youth Basketball Training

This visualization is generated through the VOSviewer application, which provides various view modes, not only in the form of network visualization but also including overlay visualization and density visualization. These three types of views serve different functions and can be used complementarily depending on the analysis objectives. For instance, overlay visualization allows researchers to observe temporal dynamics or the chronological distribution of a keyword, while density visualization emphasizes the intensity of concentration on specific topics within the overall corpus of publications (Hartati et al., 2020).

The utilization of diverse visualization modes enables researchers to interpret bibliometric maps more profoundly, not only in terms of the interconnections between topics but also in the context of the development and density of research focus. Thus, Figure 3 serves not only as an illustration of thematic relationships but also as an exploration tool for identifying dominant research areas and potential topics that remain under-explored in the study of youth basketball training.

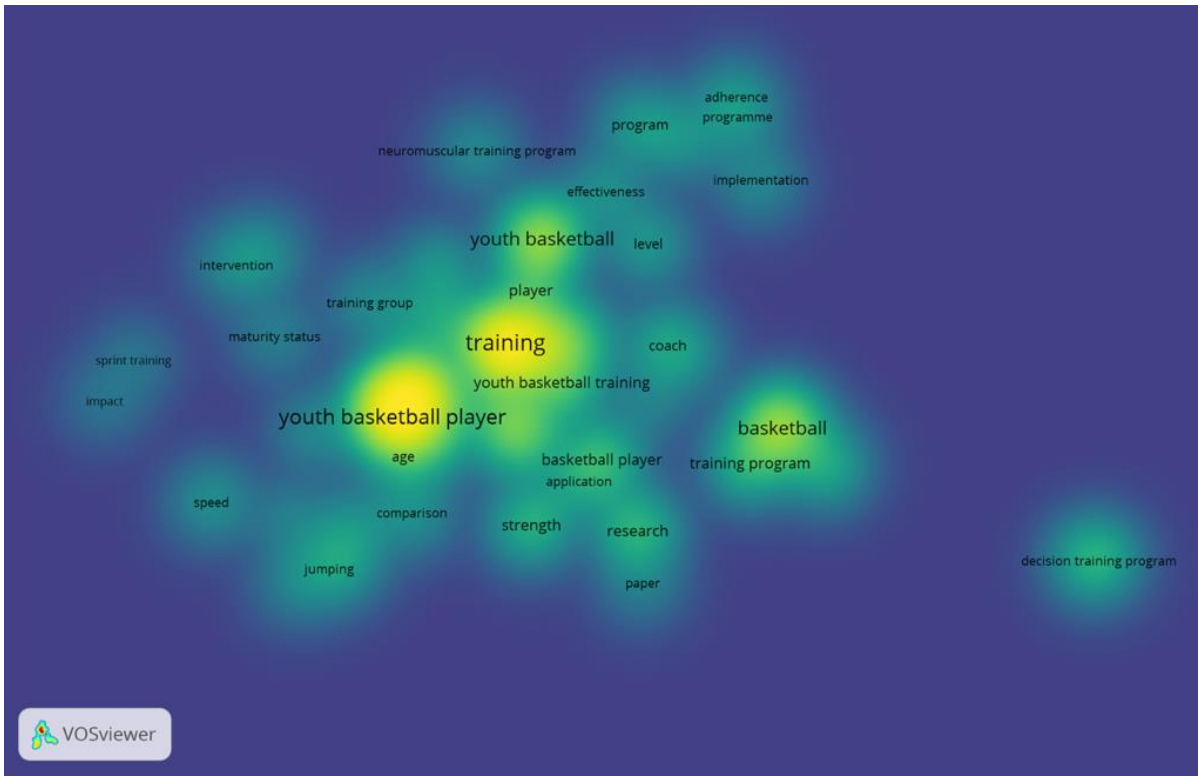

Figure 4. Density Visualization with Keywords of Youth Basketball Training

Density Visualization in VOSviewer serves to illustrate the density distribution of items, such as keywords, based on their quantity and weight within a bibliometric map area. The colors in this visualization reflect the level of density around a particular point: areas that display yellow indicate a high concentration of closely related items with significant weight, while areas colored blue signify low density, indicating a scarcity of items with relatively low weight (Kahfi et al., 2022).

As shown in Figure 4, there are several keywords that exhibit a higher level of correlation strength and frequency of occurrence compared to other keywords. Keywords such as training, basketball, youth basketball, and youth basketball player are presented in the yellow color spectrum, indicating that these terms frequently appear in the literature and have a high thematic connection with other keywords in the cluster. This visual dominance indicates that issues related to training and the development of youth basketball players have become a primary focus in the research domain during the period of 2015–2025. This density visualization is very useful in identifying research hotspots, as well as providing a deeper insight into the structure of the most discussed topics in scientific publications. Thus, researchers can direct the focus of their future studies to less dense areas as an effort to enrich the literature and fill research gaps that have not been extensively explored.

This study has several notable limitations. First, the exclusive reliance on Google Scholar as the database may affect both the comprehensiveness and precision of the data. Its inclusion of non-peer-reviewed documents and limited filtering capabilities, compared to more curated databases like Scopus or Web of Science, is a significant consideration. Second, the bibliometric analysis focused solely on

metadata—specifically titles, abstracts, and keywords—without delving into full-text content, which could limit the depth of thematic interpretation. Third, language bias may be present, as the analysis included only publications in English and Indonesian, potentially overlooking important works published in other languages. Lastly, the lack of inter-database comparisons may restrict the validation of citation impact and thematic saturation across different platforms.

To enhance future research, it is recommended to broaden bibliometric mapping by integrating multiple academic databases, such as Scopus and Web of Science, to improve data accuracy and thematic comprehensiveness. Longitudinal studies that track thematic evolution beyond 2025 could yield valuable insights into emerging trends. Moreover, subsequent analyses should incorporate psychological, cognitive, and socio-cultural variables to complement the current emphasis on physical development. The use of full-text content analysis and machine learning techniques, such as topic modeling, could uncover deeper thematic layers and latent patterns. Finally, conducting comparative bibliometric studies across different regions or gender-specific cohorts could reveal contextual differences in youth basketball training research and practices.

CONCLUSION

Based on the analysis and discussion presented earlier, it can be concluded that the VOSviewer software is an effective tool for mapping and conducting bibliometric data analysis. In the context of this research, VOSviewer was used to map publication trends related to youth basketball training during the period of 2015–2025. The analyzed data were sourced from Google Scholar and collected through the Publish or Perish application, using the primary keyword "Youth Basketball Training." In total, 111 scientific documents were successfully identified and analyzed, demonstrating a fluctuating publication dynamic yet showing an overall increasing trend during that period.

The findings indicate dynamic publication trends, with thematic clustering revealing six dominant research focuses, including training load management, strength and plyometric training, biological maturation, and program implementation. Cluster 1 contains 12 topics, cluster 2 consists of 11 topics, cluster 3 encompasses 10 topics, cluster 4 consists of 9 topics, cluster 5 includes 7 topics, and cluster 6 comprises 6 topics. The diversity and interconnection among these topics illustrate a broad spectrum of scientific interest in the development of competencies for young basketball players, ranging from physical aspects such as strength and agility to training strategies and the implementation of intervention programs.

Temporal trend analysis indicates a significant increase in the number of publications from 2016 to 2019, followed by a decline from 2020 to 2022. This decline is likely influenced by restrictions on field activities during the COVID-19 pandemic, which hindered the implementation of experimental research and field data collection. Nevertheless, a resurgence was recorded in 2023 and 2024, indicating a recovery of research activities in this area.

Practically, this study provides valuable insights for basketball coaches, sports academies, and training institutions to adopt evidence-based strategies tailored to the biological development stages of young athletes. Coaches are encouraged to apply individualized training programs, monitor training loads systematically, and integrate varied modalities such as plyometric and neuromuscular training to optimize performance and reduce injury risk. Institutions may also utilize these findings to update their curricula and coaching certifications in alignment with current research trends.

From a research perspective, future bibliometric studies are recommended to utilize cross-database integration (e.g., Scopus, Web of Science) for a broader scope and comparative analysis. Further investigation into underexplored areas—such as psychological resilience, motivation, cognitive development, and gender-specific training interventions—could enrich the academic discourse. Additionally, employing advanced techniques like full-text topic modeling and longitudinal bibliometric tracking will deepen understanding of how youth basketball training research evolves over time and across regions. In conclusion, this study not only outlines the structure and direction of current scholarship but also serves as a reference point for guiding future academic inquiry and practical advancements in youth basketball development.

The implications of this analysis provide opportunities for further research, particularly in the year 2025 and beyond, to explore various aspects of coaching in youth basketball, including through multidisciplinary approaches such as training technology, biomechanical analysis, and sports psychology. This research also offers practical contributions, especially for coaches, academics, and sports practitioners, in understanding the existing literature landscape, thus serving as a foundation to design training programs that are evidence-based and relevant to the needs of young athletes in the contemporary era.

REFERENCES

Arede, J., Fernandes, J. F. T., Schöllhorn, W. I., & Leite, N. (2022). Differential Repeated Sprinting Training in Youth Basketball Players: An Analysis of Effects According to Maturity Status. *International Journal of Environmental Research and Public Health*, 19(19). https://doi.org/10.3390/ijerph191912265

Brian, A., Pennell, A., Taunton, S., Starrett, A., Howard-Shaughnessy, C., Goodway, J. D., Wadsworth, D., Rudisill, M., & Stodden, D. (2019). Motor Competence Levels and Developmental Delay in Early Childhood: A Multicenter Cross-Sectional Study Conducted in the USA. *Sports Medicine*, 49(10), 1609–1618. https://doi.org/10.1007/s40279-019-01150-5

DiFiori, J. P., Güllich, A., Brenner, J. S., Côté, J., Hainline, B., Ryan, E., & Malina, R. M. (2018). The NBA and Youth Basketball: Recommendations for Promoting a Healthy and Positive Experience. In Sports Medicine (Vol. 48, Issue 9, pp. 2053–2065). *Springer International Publishing*. https://doi.org/10.1007/s40279-018-0950-0

Elferink-Gemser, M., Chris, V., Koen, L., & and Mulder, T. (2004). Relation between multidimensional performance characteristics and level of performance in talented youth field hockey players. *Journal of Sports Sciences*, *22*(11–12), 1053–1063. https://doi.org/10.1080/02640410410001729991

Forsman, Hannele, Blomqvist, Minna, Davids, Keith, Konttinen, Niilo, & Liukkonen, Jarmo. (2016). The role of sport-specific play and practice during childhood in the development of adolescent Finnish team sport athletes. *International Journal of Sports Science & Coaching*, *11*(1), 69–77. https://doi.org/10.1177/1747954115624816

Granacher, U., Lesinski, M., Busch, D., Muehlbauer, T., Prieske, O., Puta, C., Gollhofer, A., & Behm, D. G. (2016). Effects of resistance training in youth athletes on muscular fitness and athletic performance:A conceptual model for long term athlete development. In Frontiers in Physiology, 7. *Frontiers Research Foundation*. https://doi.org/10.3389/fphys.2016.00164

Gryko, K., Kopylov, P., Blach, W., & Michalak, E. (2022). Biological maturation and physical performance in young male basketball players aged 13–15 years. *Biology of Sport*, 39(3), 639–646. https://doi.org/10.5114/biolsport.2022.108168

Han, J., Waddington, G., Anson, J., & Adams, R. (2023). Physical determinants of performance in youth basketball: A systematic review. *International Journal of Sports Science & Coaching*, 18(1), 122–134. https://doi.org/10.1177/17479541221130005

Han, M., Gomez-Ruano, M. A., Calvo, A. L., & Calvo, J. L. (2023). Basketball talent identification: a systematic review and meta-analysis of the anthropometric, physiological and physical performance factors. In Frontiers in Sports and Active Living, 5. *Frontiers Media SA*. https://doi.org/10.3389/fspor.2023.1264872

Hartati, I., Ariyani, S., Haswati, H., Nafik, H. A., & Zulfa, D. Y. (2020). Analisa Bibliometrik Publikasi Ilmiah Bertema Biorefineri Biomassa Berlignoselulosa. *Jurnal Inovasi Teknik Kimia*, 5(1). https://doi.org/10.31942/inteka.v5i1.3401

Jawabreh, L., Tounsi, M., Racil, G., Padulo, J., Migliaccio, G. M., Russo, L., & Trabelsi, Y. (2025). Specific Physical Performances of Young Male Basketball Players in Palestine: An Assessment by Maturity Status. *Children*, 12(1), 64. https://doi.org/10.3390/children12010064

Jimenez-Daza, P., Teba del Pino, L., Calleja-Gonzalez, J., & Saez de Villarreal, E. (2023). Maturity Offset, Anthropometric Characteristics and Vertical Force–Velocity Profile in Youth Basketball Players. *Journal of Functional Morphology and Kinesiology*, 8(4). https://doi.org/10.3390/jfmk8040160

Kahfi, A. A., Rizal, M., Herawati, T. (2022). Pemetaan Bibliometrik dengan Vosviewer Terhadap Perkembangan Hasil Penelitian Implementasi Good Corporate Governance. *Research Journal of Accounting and Business Management*, 6(1). https://doi.org/10.31293/rjabm.v6i1.5847

Mikołajec, K., Arede, J., & Gryko, K. (2025). Examining physical and technical performance among youth basketball national team development program players: a multidimensional approach. *Scientific Reports*, 15(1), 3722. https://doi.org/10.1038/s41598-025-87583-7

Nobre, G. C., Valentini, N. C., & Nobre, F. S. S. (2018). Fundamental motor skills, nutritional status, perceived competence, and school performance of Brazilian children in social vulnerability: Gender comparison. *Child Abuse and Neglect*, 80, 335–345. https://doi.org/10.1016/j.chiabu.2018.04.007

Oktarifaldi, O., Marta, I. A., Nugroho, A. W., Hardi, V. J., & Utomo, S. (2024). Keterampilan Gerak Dasar Kelompok Usia 7 sampai 9 Tahun siswa Sekolah Dasar. *Jendela Olahraga*, *9*(1), 10–23. https://doi.org/10.26877/jo.v9i1.17646

Soares, A. A. L., Lima, A. B., Miguel, C. G., Galvão, L. G., Leonardi, T. J., Paes, R. R., Gonçalves, C. E., & Carvalho, H. M. (2023). Does early specialization provide an advantage in physical fitness development in youth basketball? *Frontiers in Sports and Active Living*, 4. https://doi.org/10.3389/fspor.2022.1042494

Wang, P., Shi, C., Chen, J., Gao, X., Wang, Z., Fan, Y., & Mao, Y. (2024). Training methods and evaluation of basketball players' agility quality: A systematic review. Heliyon, 10(1). https://doi.org/10.1016/j.heliyon.2024.e24296

Williams, A. M., Paul R., F., & and Drust, B. (2020). Talent identification and development in soccer since the millennium. *Journal of Sports Sciences*, *38*(11–12), 1199–1210. https://doi.org/10.1080/02640414.2020.1766647