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# A Bibliometric Analysis of Coaching Behaviour and Practice Activities: Evidence from Web of Science

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## ABSTRACT

**Purpose:** The aim of this study is to examine publications on coaching behaviour and practice activities through a bibliometric methodology

**Method:** Prior to data collection, a preliminary set of studies relevant to sports coaches' behaviour and practice activities was reviewed (n = 50). From this review, the most frequently occurring keywords were extracted to inform the search strategy. An advanced search was utilising the "Topic" option in Web of Science (WoS) on March 11, 2026. A total of 3719 relevant records were initially identified. Following a filtering process - restricting results to journal articles published in English within the field of sports sciences - 506 articles were retained for the bibliometric mapping. Data analysis and visualisation were performed using Microsoft Excel®, VOSviewer®, and WordClouds.com. While Microsoft Excel was employed to assess annual publication trends, most-cited articles and most-productive journals, VOSviewer played a pivotal role in visualising collaboration patterns and identifying key countries, institutions, authors and authors' keywords. The final co-word map was created through WordClouds.com.

**Results:** The results indicated that Christopher Cushion was a leading author and the most productive journal was the Journal of Sports Sciences. The most influential research institution was Loughborough University, and the country with the highest number of publications is England. The most frequently used keywords were "coaching", "self-determination theory" and "sport". It is noteworthy that publication volume has markedly increased since the first decade of the millennium. The highest number of publications recorded in 2020.

**Conclusion:** The Anglophone research community emerges as a leading contributor in the present dataset. Publications related to coaching behaviour and practice activities appears to be a growing area of interest. Content or thematic analyses enabling a clearer illustration of emerging themes warrant further investigation.

**Keywords:** Coaching science, Practice design, Research trends, Athlete, Sport pedagogy

## ÖZET

### Antrenör Davranışları ve Antrenman Alıştırmalarının Bibliyometrik Analizi: Web of Science Yayınlarının İncelenmesi

**Amaç:** Bu araştırmanın amacı, antrenör davranışları ve antrenman alıştırmaları ile ilgili makalelerin bibliyometrik analizinin yapılmasıdır.

**Yöntem:** Araştırmada tarama yapılmadan önce; tarama yapılacak anahtar kelimelerin belirlenmesi için konu ile ilgili öne çıkan güncel araştırmalar incelenmiş (n=50), arama işlemi tespit edilen anahtar kelimeler ve Boolen operatorleri ile ileri arama teknikleri kullanılarak Web of Science (WoS) veri tabanında gerçekleştirilmiştir (11 Mart 2026). Arama sonucunda öncelikle 3719 kayıtlı makaleye ulaşılmış, spor bilimleri alanında son 43 yılda (1983-2026) İngilizce yayınlanan 506 araştırma makalesi çalışmaya dahil edilmiştir. Verilerin analizinde ve görselleştirilmesinde Microsoft Excel®, VOSviewer® ve WordClouds.com platformları kullanılmıştır. Araştırmada sırasıyla; konu ile ilgili yıllık araştırma sayısı ve bu sayıların yıllara

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göre değişimi, en fazla atıf alan çalışmalar, en üretken yazar, dergi, üniversite ve ülkeler ile bu yazar, üniversite ve ülkeler arasındaki iş birlikleri ve en sık kullanılan anahtar kelimeler tespit edilmiştir.
**Bulgular:** Konu ile ilgili en üretken yazar Christopher Cushion, en üretken dergi ise Journal of Sports Sciences'tır. En etkili araştırma merkezi Loughborough Üniversitesi, en fazla makaleye sahip ülke İngiltere'dir. Yazarlar tarafından en sık kullanılan anahtar kelimeler; "coaching" "self-determination theory" ve "sport" olmuştur. İlaveten, 2010 yılından sonra konu ile ilgili çalışmaların belirgin bir artış gösterdiği, en fazla yayın yapılan yılın 2020 yılı olduğu tespit edilmiştir.
**Sonuç:** Antrenör davranışları ve antrenman pratikleri ile ilgili literatürün merkezinde Anglofonların yer aldığı görülmektedir. Konu ile ilgili üretilen araştırma sayıları, söz konusu disiplinin ilgi gören bir araştırma alanı olduğunu ortaya koymaktadır. İlerdeki çalışmalarda etkili ve öncü yayınların içerik ve tematik analizleri de metrik analizlere dahil edilerek konu ile ilgili uzmanlaşılmış, gerileyen ya da yükselen alanlar daha kapsamlı ortaya konulabilir.
**Anahtar Kelimeler:** Antrenörlük, Antrenman dizaynı, Araştırma trendleri, Sporcu, Spor pedagojisi

## INTRODUCTION

Coaching behaviours and practice (training) activities represent central pillars of athlete development. Coaches employ a variety of behaviours during training (e.g., instruction, modelling, humor, punishment etc.), frequency of which may vary across different context ( Partington & Cushion, 2013). Practice activities can be classified into three main categories: training form (drills), playing form, and transition (inactive) period: training form activities are repetitive drills performed through predetermined movement sequences, playing form activities are match-like activities that require athletes to interact continuously with teammates and opponents. Transition periods refer to segments of training in which athletes are not actively engaged in either drills or games (Ford et al., 2010; O'Connor et al., 2018).

In recent years, there has been growing interest in identifying ideal pedagogical approaches that support athlete development (Stodter & Cushion, 2019; Jones et al., 2024). Systematic observation of coaching behaviour first emerged in the 1970s (Smith et al., 1978), while research on practice activities demonstrated an upward trend after 2010 (Ford et al., 2010). Previous studies reveal that the field's issues can be a fairly diverse from describing how coaches act during training to elucidating coaches' perspectives or learning and so forth (Aarons et al., 2024; Cope et al., 2017; Kinnerk et al., 2024).

A copious number of publications can provide an overview of knowledge in a given domain. However, the overwhelming number of studies makes difficult to illustrate whole picture of the domain. Papers such as meta-analysis, systematic review or bibliometric mapping attempt to transform this dispersed knowledge into systematic format. Bibliometric techniques offer a holistic mapping of large research landscapes (Donthu et al., 2021). It also enable the

assessment of the field's progress and most occurences keywords along with the collaborative networks among researchers, institutions or countries (Mukherjee et al., 2022; Donthu et al., 2021). Donthu et al. (2021) note that bibliometric studies have gained popularity in recent times. This trend can largely be attributed to the accessibility of bibliometric software such as VOSviewer, Biblioshiny, Gephi and Leximancer. Evidence from a Web of Science show that a similar upward trend is also observable in sport-related subjects. Such studies have increased nearly tenfold over the past decade compared with the preceding ten-year period (March 2, 2026).

Recently, a number of bibliometric initiatives have drawn particular attention to coaching. Cruz and Kim (2023) examined published articles concerning coach leadership over the last 30 years. They found that publications related to coach leadership have shown a steady growth since 1990. The United States, Canada, the United Kingdom, and Belgium were the top countries involved in coaching leadership. Wijayanti et al. (2025) carry out a bibliometric analysis to examine the literature on coach-athlete relationships and athlete mental health from over the past 30 years. They show the United States being the leading contributor in research productivity. Peñuela-Arguello et al. (2026) also investigate the scientific production landscape of sports coach learning over two decades. They demonstrated that the International Journal of Sport Science and Coaching has published the largest number of studies**.** Taken together, Gibert and Trudel (2004) and Sheehy et al. (2018) analyse coaching science research published across distinct time spans. None of these publications provide a metric of coaching behaviour and practice activities. As far as we are concerned, it has yet to be explored.

Therefore, the objective of this study is to examine publications on coaching behaviour and practice activities through bibliometric methodology. Thus, offering a comprehensive summary of the publications within this field.

## METHODS

### *Data Sources*

The methodological framework of this research was grounded in earlier bibliometric studies and methodological guidelines (Doğruer & Öğraş, 2025; Donthu et al., 2021; Li et al., 2024; Mukherjee et al., 2022). Unlike traditional systematic reviews, bibliometric analysis is inherently quantitative and facilitates the examination of large-scale datasets. The primary data source for this study was the Web of Science (WoS) collection. WOS is recognised as a comprehensive platform that indexes over 30,000 journals and 250 subject categories. Its extensive archival coverage dating back to the 1800s (Clarivate, 2026). Prior to data collection,

a preliminary set of studies relevant to sports coaches' behaviour and practice activities was reviewed (n = 50). From this review, the most frequently occurring keywords were extracted to inform the search strategy. Accordingly, an advanced search utilising the "Topic" option in WoS on March 11, 2026: TS = (('coach*-behav*' OR 'coach*-practice*' OR 'coach*-session*') OR ('practice*-activit*' AND play* OR 'training-form') OR ('practice*-design' AND play* OR 'training-form') OR ('systematic-observ*' AND coach*) OR ('microstructure-of-training') OR ('microstructure-of-practice*')). A total of 3719 relevant records were initially identified. Following a filtering process – restricting results to journal articles published in English within the field of sports sciences – 506 articles were retained for the bibliometric analysis. All documents were exported in Plain text or Excel formats for data analyses.

***Data Analyses***

Data analysis and visualisation were performed using Microsoft Excel®, VOSviewer®, and WordClouds.com. First, Microsoft Excel was employed to analyse trends in annual publications, identify the most-cited articles, and assess the most-productive journals. Second, VOSviewer helped identify the most productive countries, institutions, and authors as well as the most frequently used author keywords. Prior to this analyses, the study's first author pre-processed the dataset to ensure consistency and accuracy: variations in author, institution, and country names were standardised to avoid duplication. For example, "Cushion, C", "Cushion, Chris", and "Cushion, C.J" were unified as “Cushion, CJ". Relatedly, 84, 19, and 2 synonymous terms were unified for authors, institutions, and countries, respectively. VOSviewer also played a pivotal role in visualising collaboration patterns among countries, institutions, and authors. Setting a minimum document threshold is essential before visualising the network map. A minimum threshold of three documents was applied. While node size reflects the weight of an item (e.g., author) in these visual representations, the links and colours illustrate collaborations and highlight groups of closely connected. The final phase in data analysis is co-word analysis through WordClouds.com. Only keywords with a minimum five occurrences were included in the word cloud. The results were cross-validated against the keyword list generated from VOSviewer. Although several keywords exhibited analogous concepts or orthographic variations (e.g., "periodization"- "periodisation"; "coach behaviour" -"coachbehavior" - "coaching behaviour"), no manual standardization was applied. Figure 1 illustrates the step-by-step processes of the study procedures.

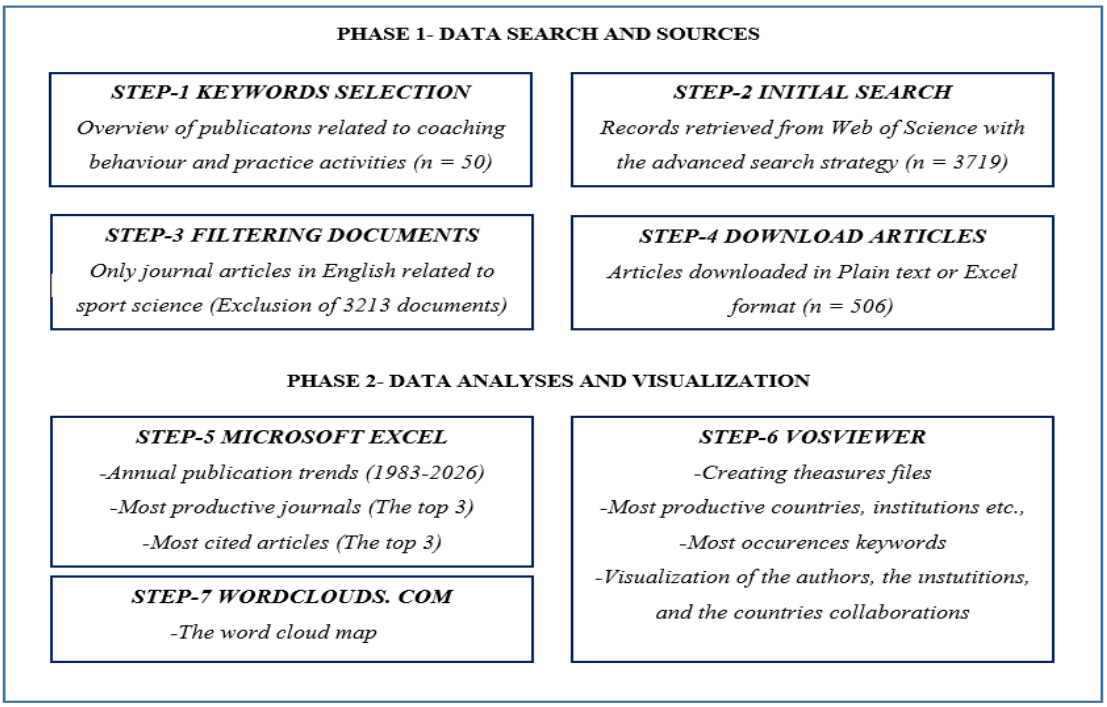


**Figure 1** Research Protocol

## RESULTS

### *Number of Publication Volume and Highlighted Articles*

This study analyses a dataset of 506 papers over a 43-year period (Figure 2). The earliest publication in this dataset was carried out by Ronald Smith and his colleagues in 1983, entitled "Behavioral Assessment in Youth Sports: Coaching Behaviors and Children's Attitudes" (Smith et al., 1983). The number of published articles in the past 15 years has risen more than fourfold relative to preceding period (417 & 89), reaching a peak in 2020 (n = 42). The average number of citations per publication was 32 (0-639) for WoS Core databases. The most cited paper is "Psychological Characteristics and Their Development in Olympic Champions" followed by "Coach Education and Continuing Professional Development: Experience and Learning to Coach" and "Controlling Interpersonal Style in a Coaching Context: Development and Initial Validation of a Psychometric Scale" (Bartholomew et al., 2010; Cushion et al., 2003; Gould et al., 2002).

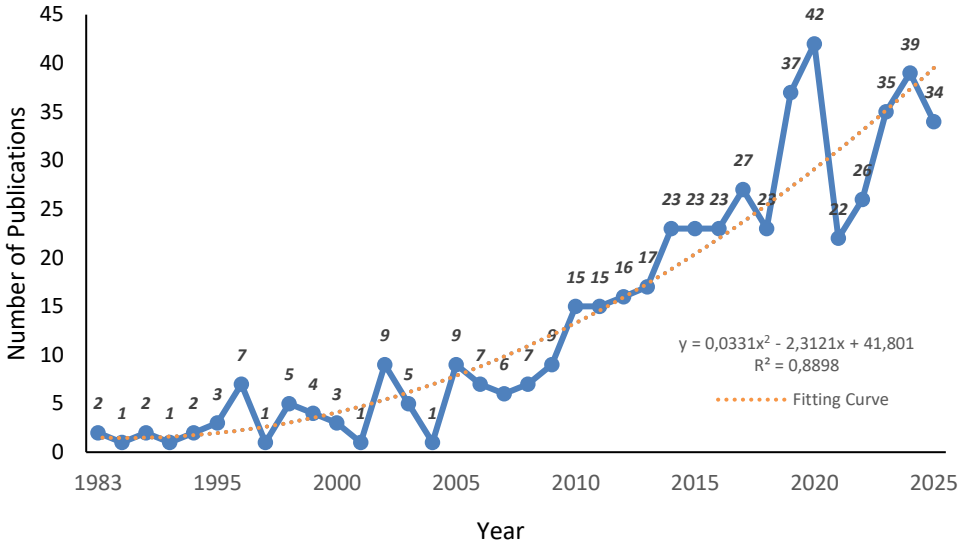


***Figure 2*** *Publication volume across years*

***Most Productive Journals***

A minimum of one publication have published in 80 distinct journals. The Journal of Sports Sciences stands out as a leading journal with 44 published documents, followed by Journal of Applied Sport Psychology - Psychology of Sport and Exercise and Sport, Education and Society. These four journals account for nearly one-third of the total publications (165 of 506).

***Most Productive Authors and Authors' Collaborations***

A total of 1,424 authors contributed to the publications. Christopher Cushion is a leading author with 14 publications and 1,669 citations. Nikos Ntoumanis and Robyn Jones are the second and third most prolific authors in terms of publication output (11 and 9 documents, respectively). Citation rankings differ as Robyn Jones and Kathleen Armour hold the second and third positions (1,221 and 972 citations, respectively). Figure 3 illustrates the co-authorship of 107 authors, each with a minimum of three documents on the subject. A collaboration network divided into nine clusters. The most dense cluster is green and has consisted of 9 authors. The green cluster is predominantly formed by scholars from Ghent University and the University of Leuven.

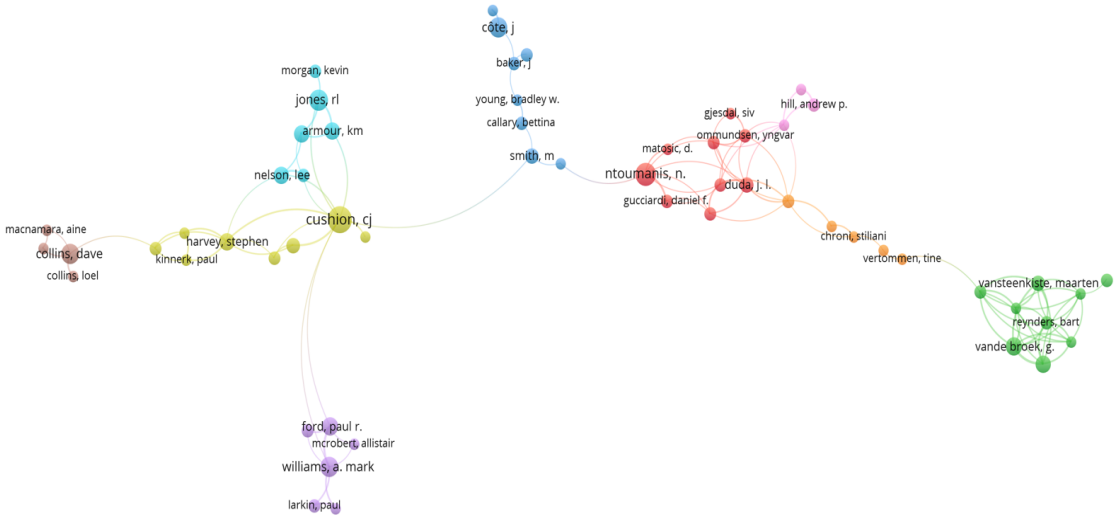


**Figure 3** Author collaboration network

***Most Productive Institutions and Institutions' Collaborations***

A total of 619 distinct institutions have covered the domain of coaching behaviour and practice activities. Loughborough University (2,429 citations; 32 documents) is the most productive institution followed by, the University of Birmingham (1,030 citations; 17 documents), Michigan State University (13 documents; 359 citations) and Victoria University (9 documents; 1,007 citations). Figure 4 illustrates the collaboration network among 104 institutions, each with a minimum of three documents. Loughborough University is the most central and prominent institution. It has strong relationships with several organisations; total link strength is 60.

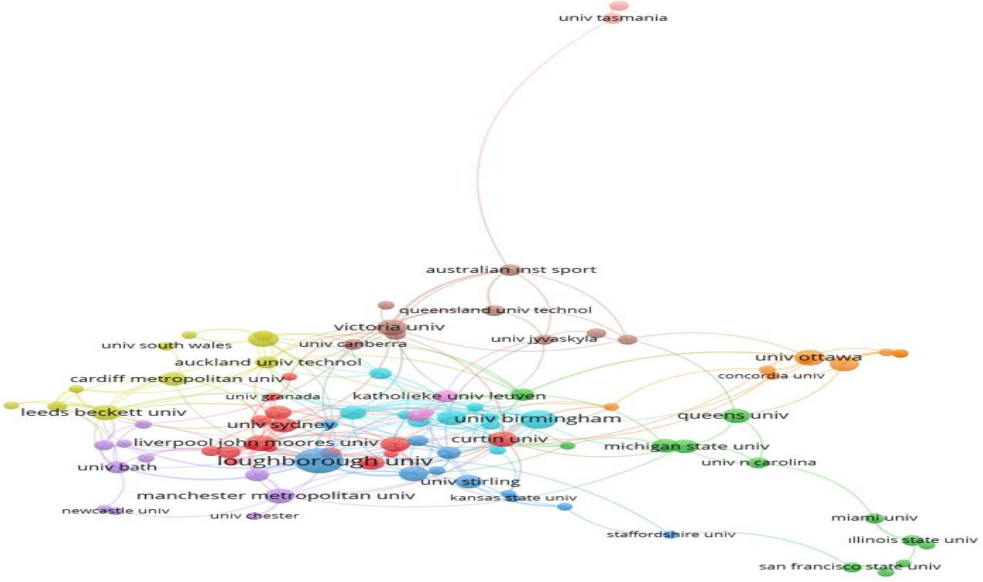


**Figure 4** Institutions collaboration network

***Most Productive Countries and Country Collaborations***

A total of 59 countries have contributed to the field. England is the leading contributor with 146 publications and 6,149 citations, followed by the USA (115 publications; 5,043 citations) and Canada (76 publications; 2,328 citations). Figure 5 shows collaboration among 33 countries, each with a minimum of three publications. The cooperative network is divided into seven distinct colour clusters. The green cluster is the largest and centred on England.

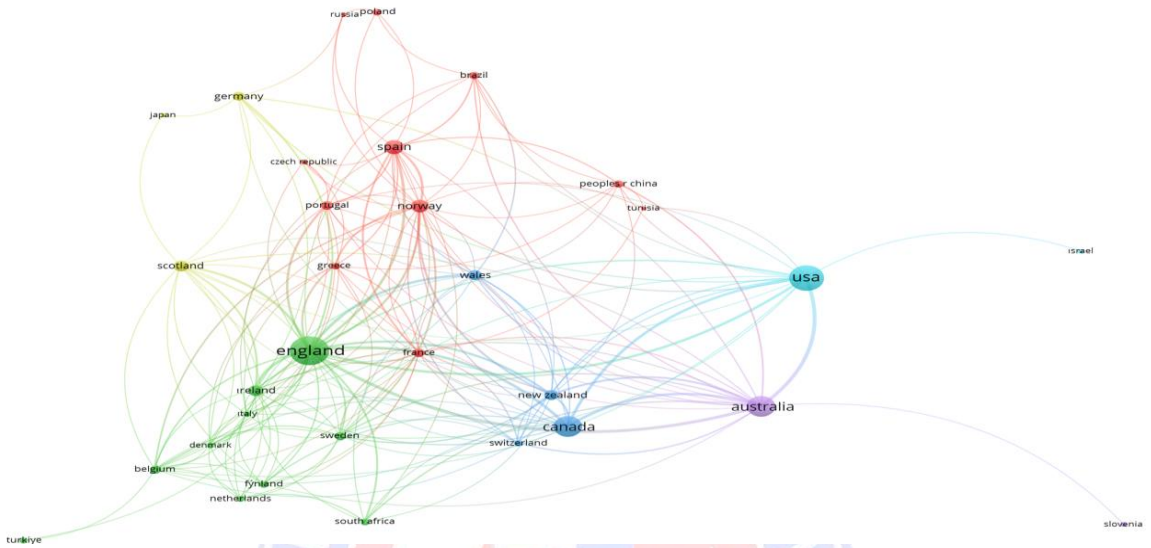


**Figure 5** Country collaboration network

***Keywords Analysis***

Figure 6 depicts a cloud of authors' keywords. Only 55 of 1,245 keywords appeared five or more times. "Coaching", "self-determination theory" and "sport" are the most prevalent terms.


**Figure 6** Keyword word cloud

## DISCUSSION and CONCLUSION

To the best of our knowledge, this study is the first bibliometric analysis centred on coaching behaviour and practice activities. The body of literature in this field has grown markedly over the past half century, particularly after 2010. In line with Price's law (1986), this upward trajectory is likely to be sustained in the following years; the evolution of the research field can be outlined in four distinct stages: (i) pioneers commence publications in a particular research domain, (ii) exponential growth occurs as many scholars explore the topic, (iii) the consolidation and accumulation of knowledge around the subject, and (iv) a decrease in publications. 2010 marked a turning point, as the annual number of publications reached double figures and remained stable thereafter. So, one may speculate that this shift could be associated with the key studies by Ford et al. (2010) and Bartholomew et al. (2010). While Ford et al. (2010) investigated the practice activities and instructional behaviours of soccer coaches, Bartholomew et al. (2010) developed the Controlling Coach Behaviors Scale to assess sports coaches' interpersonal behaviour. Both lines of inquiry align with the previous findings that behaviour assessment is one of the most investigated sport coaching related theme (Gilbert & Trudel, 2004; Sheehy et al., 2018).

Author's keywords serve as a useful lens for identifying focal areas within a given research domain. In the present data, "coaching" emerges as the most prevalent keyword, followed by "self-determination theory" and "sport". Given the scope of this inquiry, the prominence of "coaching" and "sport" are unsurprising. However, frequent occurrence of "self-determination theory" points to substantial body of research examining the relationship between coaches and athletes motivation in our dataset. Nevertheless, the issue of keyword noise should be taken into account when interpreting these results. Semantically similar keywords may appear in multiple forms as a result of minor lexical variations (e.g., sport, sports). To mitigate this issue, authors are encouraged to adapt systematic keyword selection strategies, including the use of wildcards such as " * " and follow established keyword guidelines provided by publishers (Taylor & Francis, Wiley, or Springer Nature). Such practices are likely to enhance their research visibility and availability.

Our findings indicate that the most prolific journals predominantly concentrate on themes related to athletics, psychology, and education. The overall scope of journals in the coaching literature remains largely stable, even though their relative rankings demonstrate fluctuations over time (Gilbert & Trudel, 2004). Notably, The Journal of Sports Science - as the most productive journal - has acquired more than 100 citations per year during the last 15 years. This

represents a quite pleasing level of impact corresponding to roughly one in every six citations in the field. The Journal of Sport Sciences possesses an international reputation and publishes articles on a broad spectrum of topics, including biomechanics, sports medicine, talent identification and so forth. Its wide thematic scope likely enhances both publication visibility and accessibility.

Christopher Cushion is a professor of coaching and pedagogy at Loughborough University. Nearly all of his publications focus on "coaching" throughout his career (WoS, 2026). Relatedly, Prof. Cushion with Robyn Jones and Kathleen Armour published "Coach education and continuing professional development: Experience and learning to coach" in 2003 (Cushion et al., 2003). This paper has become one of the most influential research in the field since its publications, establishing its authors as prominent authorities. In parallel, Nikolaos Ntoumanis also warrant particular attention; he ranks among the top three authors in terms of publication output, yet his citation impact remains comparatively lower. Prof. Ntoumanis has a multidisciplinary research profile. He is also recognised as one of the leading researchers in the field of motivation and behaviour change (WoS, 2026) His extensive research portfolio may limit citations within particular domains that favour more focused lines of inquiry.

Loughborough University attained the premier position in the present dataset. Similar to prior research identified Loughborough as either the leading or among the leading institutions in coaching-related research (Peñuela-Arguello et al., 2026; Wijayanti et al., 2025). Its reputation for sport sciences, facilities, and partnerships reinforce to foster the advancement of high-quality scientific products. Loughborough has maintained the top global position in sport-related subjects over a decade (QS, 2026). A similar pattern is also observed for other prominent institutions in our dataset: the University of Birmingham, Michigan State University, and Victoria University occupy high positions in both global QS and Shanghai rankings (QS, 2026; ARWU, 2026). Consistent with Shin et al. (2013) institutions in developed systems tend to exhibit higher levels of collaboration than those in developing systems. While Shin et al. (2013) reported no greater collaboration among institutions in English-speaking countries, our results suggest that Anglophone institutions both collaborate more extensively and contribute more substantially to the field.

England's leading position is largely underpinned by its distinguished scholars and prestigious institutions. Research produced by its major institutions and authors are likely disseminated nationwide through networks and conferences. The most productive countries - namely England, the United States, Canada, and Australia - also exhibit robust international

collaborations. Such collaborations may partly be explained by characteristics of these countries, particularly their advanced sport systems and institutional structures. They accounted for approximately one in four gold medals among 206 nations at the 2024 Paris Olympic Games.

This study is not without its limitations. First, the data were derived from the WoS database; thus, relying on it may have resulted in missing out on relevant articles from other sources such as Scopus, SportDiscus and Google Scholar. Second, the scope of the study was limited to peer-reviewed articles in English. The exclusion of dissertations, conference papers, and non-English-language publications warrant further investigations. Third, the analysis was limited to VOSviewer, Excel and WordCloud.com. Future studies may benefit from incorporating advanced analytics tools such as Biblioshiny, CiteSpace, Gephi and so forth.

Overall, the Anglophone research community emerges as a leading contributor in the present dataset. Publication related to coaching behaviour and practice activities appears to be a growing area of interest, with around ten publications indexed in WoS during the first quarter of 2026. It is remarkable that prominent coaching journals such as Sports Coaching Review, the International Sport Coaching Journal and the Journal of Sports Science & Coaching show no publications during this period. Anecdotally, even tough common keywords like ‘coaching’, ‘self-determination’, and ‘sport’ point to emerging themes, these themes require further validation by concepts such as ‘density’ and ‘centrality’ in thematic or content analyses. Such analyses could be further enriched through incorporating bibliometric approaches like Bradford's or Lotka's Law (Lotka, 1926; Morse & Leimkuhler, 1979). Nevertheless, shifting the focus from "what coaches actually do in training" to "what coaches actually do in daily life" may open up new avenues for inquiry. In addition, emerging areas such as examination of new technologies in coaching, coaching physiology, and para-coaching represent promising yet underexplored directions for future research.

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