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Current Interventions in Sport: A Bibliometric Analysis of Mindfulness-Based Approaches (MSPE & MMTS)

Sporda Güncel Müdahaleler: Farkındalık Temelli Müdahalelerin Bibliyometrik Analizi (MSPE & MMTS)

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Current Interventions in Sport: A Bibliometric Analysis of Mindfulness-Based Approaches (MSPE & MMTS)

Abstract

This study aims to examine, from a bibliometric perspective, the current trends, conceptual development, and research networks of research on Mindful Sports Performance Enhancement (MSPE) and Mindful Meditation Training for Sport (MMTS) interventions in the context of performance, mindfulness, and athlete. Data were obtained from the Web of Science database on October 24, 2025. The search strategy involved accessing studies between 2004 and 2025 using the keywords “MSPE” OR “mindful sport performance enhancement” OR “MMTS” OR “MMTS 2.0” OR “mindfulness meditation training for sport” OR “mindfulness meditation training for sport 2.0” AND “sport*” OR “athletic performance” OR “athlete*” AND “meditation” OR “mindfulness”. The results show a significant increase in publications after 2015 and a growing academic interest in MSPE and MMTS interventions. Trends in author keywords and word cloud analyses revealed that the keywords “meditation,” “flow,” “anxiety,” and “performance enhancement” occupied central positions, indicating that research themes primarily focused on meditation-based mechanisms, anxiety and emotion regulation, psychological well-being, and performance enhancement. Citation analyses showed that the United States led in total citations and single-country publications, while China played a significant role in international collaborations. According to Bradford Law analysis, the “Journal of Clinical Sport Psychology” and “Frontiers in Psychology” formed the core region. Author-based metrics showed that Glass C. R. was the most prolific author, while Glass J. R., Kaufman K. A., and Arnkoff D. B. were the most cited authors. Institutional collaboration networks showed limited but consistent bilateral partnerships, with Catholic University occupying a central position in the collaborative structure. These findings indicate that MSPE and MMTS constitute a growing and increasingly structured research area, with expanding scholarly attention, consolidated thematic patterns, and emerging international collaboration networks.

Key Words: Bibliometric analysis, Interventions, Performance, Sport psychology

Sporda Güncel Müdahaleler: Farkındalık Temelli Müdahalelerin Bibliyometrik Analizi (MSPE & MMTS)

Öz

Bu çalışma, performans, farkındalık ve sporcu bağlamında, farkındalıklı spor performansını geliştirme ve spor için farkındalıklı meditasyon eğitimi müdahaleleri üzerine yapılan araştırmaların güncel eğilimlerini, kavramsal gelişimini ve araştırma ağlarını bibliyometrik yöntemle incelemeyi amaçlamaktadır. Veriler, 24 Ekim 2025 tarihinde Web of Science veri tabanından “MSPE” OR “mindful sport performance enhancement” OR “MMTS” OR “MMTS 2.0” OR “mindfulness meditation training for sport” OR “mindfulness meditation training for sport 2.0” AND “sport*” OR “athletic performance” OR “athlete*” AND “meditation” OR “mindfulness” anahtar kelimeleri kullanılarak elde edilmiştir. Bulgular, sporda farkındalık temelli müdahalelere ilişkin çalışmaların 2015 yılından sonra artış gösterdiğini ortaya koymaktadır. Yazar anahtar kelimesi eğilimleri ve kelime bulutu analizlerinde “meditasyon” kelimesi merkezi konumda yer almıştır. Atıf analizleri, Amerika Birleşik Devletleri'nin toplam atıflarda ve tek ülke yayınlarında lider olduğunu, Çin'in ise uluslararası iş birliklerinde önemli bir rol oynadığını göstermiştir. Bradford Yasası analizine göre “Journal of Clinical Sport Psychology” ve “Frontiers in Psychology” çekirdek dergiler olarak belirlenmiştir. Yayın sayısı açısından Glass C. R. öne çıkan isimdir. En fazla atıf alan yazarlar ise Glass J. R., Kaufman K. A. ve Arnkoff D. B.’dir. Kurumsal iş birliği ağ analizinde Katolik Üniversitesi merkezi bir konumda yer almıştır. Güncel müdahaleler arasında yer alan MSPE ve MMTS'ye yönelik akademik ilginin arttığı belirtilebilir.

Anahtar Kelimeler: Bibliyometrik analiz, Müdahaleler, Performans, Spor psikolojisi

Introduction

In recent years, mindfulness-based approaches in sports psychology have been increasingly studied for their effects on athletic performance. This development indicates that programs such as Mindful Sport Performance Enhancement (MSPE)[1,2,3,4] and Mindfulness Meditation Training for Sport (MMTS)[5,6] have gained increasing prominence in the scientific literature. Mindfulness-based interventions have been developed from various theoretical approaches. Accordingly, sport-specific mindfulness-based programmes have also emerged. These include Mindful Sport Performance Enhancement (MSPE)[7] and Mindfulness Meditation Training for Sport (MMTS).[8] The MMTS programme was later updated by Baltzell and Summers[9] as MMTS

2.0. MSPE stems from mindfulness-based stress reduction and mindfulness-based cognitive therapy approaches. MSPE emphasises the development of mindfulness skills and the acceptance process, teaching how to incorporate these into sport and daily life.[7]

The long-term effects of MSPE on athletes have been observed to reduce task-related anxiety and irrelevant thoughts, increase mindfulness, and sustain improvements that support athletic performance.[10] Similarly, another study found that MSPE could be a mental training intervention that increases mindfulness and anxiety-related thoughts in long-distance runners.[11] The MMTS 2.0 programme was found to facilitate athletes' coping with competitive stress and improving their focus by teaching them self-compassion and mindfulness skills. Athletes also reported that these skills improved their quality of life both on and off the field.[6]

A review of the literature reveals that mindfulness practices have been shown to improve sports performance indicators.[12,13] Bühlmayer and colleagues[14] reported in their meta-analysis that mindfulness training significantly increased athletes' mindfulness levels, physiological-psychological performance parameters, and results, particularly in sports requiring precision. Similarly, Wang and colleagues'[15] systematic review and meta-analysis of randomised controlled trials revealed that mindfulness-based interventions improve athletic performance and mindfulness-related psychological components. The effects of mindfulness training are not limited to performance outcomes; it is reported to play an important role in cognitive processes that mediate performance, such as attention[16], emotion regulation[17], and flow[18]. The literature has examined the effects of mindfulness-based interventions across various sports disciplines.[19,20,21,22,23] Si and colleagues[24] found that mindfulness training increased mindfulness and flow experience and reduced sports anxiety, thereby significantly supporting performance. Sports-focused programmes such as MAC (Mindfulness-Acceptance-Commitment) and MSPE have also been shown to be effective, particularly for elite athletes; Josefsson and colleagues[17] reported that the MAC approach reduced emotion regulation difficulties more effectively than Psychological Skills Training (PST) and increased perceived athletic performance. Similarly, Gross and colleagues[25] demonstrated that the MAC approach improved performance and psychological health indicators in female athletes. Therefore, mindfulness-based interventions have a multidimensional effect profile on performance.

Recent studies have emphasised that mindfulness-based interventions contribute to performance through mechanisms such as improving attention capacity[16] and increasing mental resilience.[4] Systematic reviews also support this general trend. Carraça and colleagues[26] highlight the performance-enhancing potential of mindfulness-based programmes for elite athletes, while Sappington and Longshore[27] note that, despite promising results in the literature, there remains a need for higher methodological quality. Reinebo and colleagues[28] state that interventions such as psychological skills training, imagery, and mindfulness show moderate effects on performance; however, the effect needs to be more strongly supported by findings from randomised controlled parallel-group designs. This highlights the need for systematic and comprehensive evaluations in the field. Bibliometric studies also reveal the direction of scientific development in the field. Birrer and colleagues[29] reported that mindfulness and acceptance-based research in the context of sport has steadily increased since 1969, with performance, flow, and acceptance-focused themes becoming increasingly prominent. The same study found a marked increase in publications after 2014, with MSPE emerging as one of the most frequently used and prominent intervention keywords in the literature. The bibliometric analysis conducted by Park and colleagues[30] shows that

psychological skill training plays an important regulatory role in performance-related variables, including stress, anxiety, motivation, and self-confidence.

These findings indicate that mindfulness-based interventions in sport constitute an emerging area of inquiry from theoretical, applied, and methodological perspectives. Despite the growing scholarly interest in the effects of mindfulness-based interventions on athletic performance and psychological outcomes, bibliometric studies that clarify how knowledge in this field is structured, identify dominant thematic patterns, and trace the evolution of research trends over time remain limited. Although umbrella reviews focusing on mindfulness-based interventions in the context of sport, exercise, and performance psychology[31], as well as systematic studies[14,32,33,34] examining the effects of mindfulness practice on performance, have been conducted, these studies primarily emphasize general mindfulness approaches and do not provide a distinct, sport-specific analysis within a comprehensive thematic and methodological framework. In response to the limited bibliometric evidence in this area, the present study employs a bibliometric approach to examine sport-specific mindfulness interventions and aims to analyse the conceptual structure of the field through co-word analysis and thematic mapping, identify major research themes and their temporal evolution, and examine the intellectual and social structures through citation and collaboration network analyses in relation to performance, mindfulness, and the athlete. Accordingly, the study synthesizes the existing body of knowledge while providing a systematic foundation to guide future research at the intersection of sport psychology and mindfulness.

METHOD

1.1. Research Model

This study aims to conduct a bibliometric analysis of the place of research on Mindful Sport Performance Enhancement and Mindfulness Meditation Training for Sport interventions in the literature, within the context of performance, mindfulness, and athlete. The research data were obtained through a systematic search of the Web of Science database on 24 October 2025. Bibliometric studies provide a robust foundation for advancing a research field by enabling a comprehensive understanding of the literature, identifying knowledge gaps, fostering the development of novel research questions, and allowing scholars to more clearly position their contributions within the field.[35] In line with the aim of the research, the Biblioshiny package in the R-Studio environment was used to obtain, analyse and visualise the data belonging to the documents found in the relevant database. Bibliometric methodologies, such as co-word analysis, thematic mapping, collaboration network, trend topics, and conceptual structure have been used. The research analysis process is shown in Figure 1.

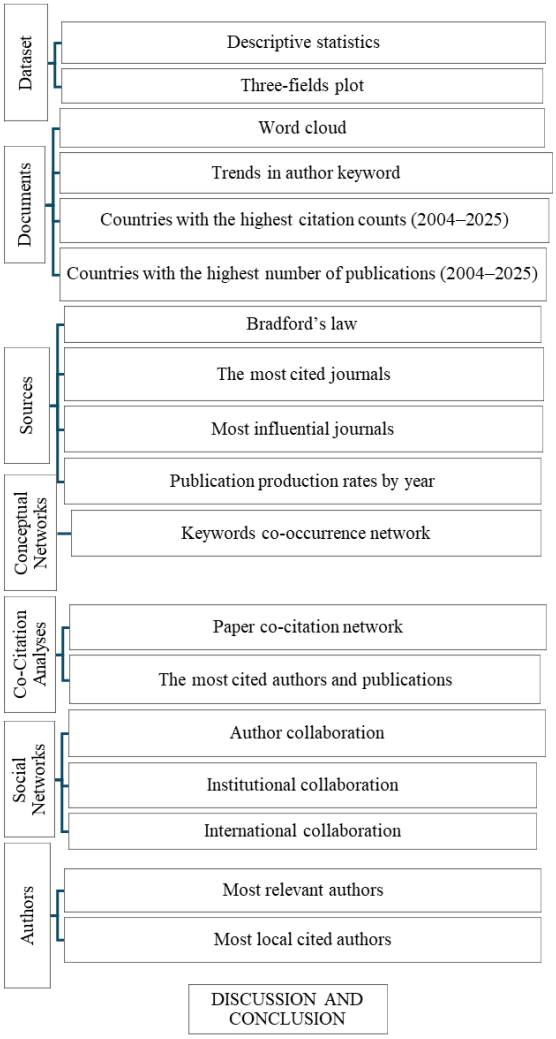

Figure 1. The Research Analysis Process

In the Web of Science database were searched using the keywords "MSPE" OR "mindful sport performance enhancement" OR "MMTS" OR "MMTS 2.0" OR "mindfulness meditation training for sport" OR "mindfulness meditation training for sport 2.0" AND "sport*" OR "athletic performance" OR "athlete*" AND "meditation" OR "mindfulness". No temporal restrictions were applied in the literature search, and all available publication years indexed in the Web of Science database were included. The search was conducted using the "All Fields" option to ensure comprehensive coverage across titles, abstracts, keywords, and additional bibliographic fields. Between 2004 and 2025, access to the BKCI-SSH, SSCI, ESCI, and SCI-Expanded indexes was provided, and the relevant publications were comprehensively examined. Only studies published in English were included in the research, resulting in a total of 109 documents. Details concerning the limitations associated with the keyword selection are provided in Figure 2.

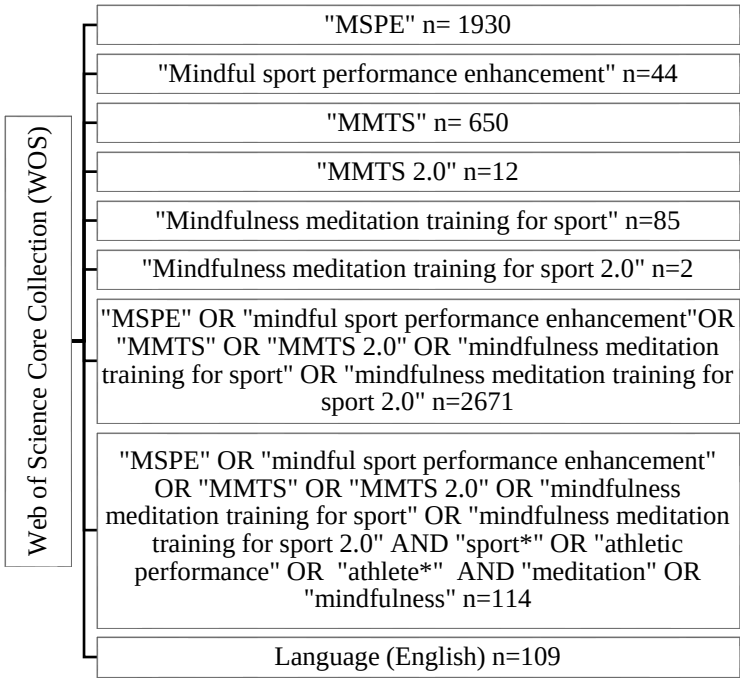

Figure 2. Keyword Analysis

2. Findings

The study accessed 109 documents in the Web of Science database containing the keywords (“MSPE” OR “mindful sport performance enhancement” OR “MMTS” OR “MMTS 2.0” OR “mindfulness meditation training for sport” OR “mindfulness meditation training for sport 2.0” AND “sport*” OR “athletic performance” OR “athlete*” AND “meditation” OR “mindfulness”) were accessed. The search results yielded articles, review articles, early access, book chapter, and book review. Analyses were conducted of the studies accessed, focusing on factors such as journal, year, author, country, keywords, and collaborations.

3.1.Dataset

Bibliometric analysis shows that 109 studies were published between 2004 and 2025 on MSPE and MMTS interventions related to performance, mindfulness, and athlete. An examination of document types revealed that articles accounted for the largest proportion, comprising 96 studies. The total number of authors included in the analysis is 422, and only 7 studies were single-authored. Descriptive statistics for the analysis are shown in Table 1.

Table 1. Descriptive statistics

Main Information About Data	Results	Document Types	Results	Document Contents	Results
Timespan	2004:2025	Article	96	Keywords Plus (ID)	304
Sources (Journals, books, etc.)	52	Article; Book chapter	1	Author's Keywords (DE)	251
Documents	109	Article; Early access	4	**Authors Collaboration**	**Results**
Annual Growth Rate %	12.99	Book Review	1	Single-authored docs.	7
Document Average Age	4.84	Review	7	Co-Authors per doc.	4.53
Average Citations per doc.	26.27	**Authors**	**Results**	International co-authorships %	120.18
References	3848	Authors	422		
		Authors of single-authored docs.	7		

Three-field plots visualising the countries and journals associated with the keyword related to MSPE and MMTS interventions in the context of performance, mindfulness and athlete, along with their connections, are shown in Figure 3.

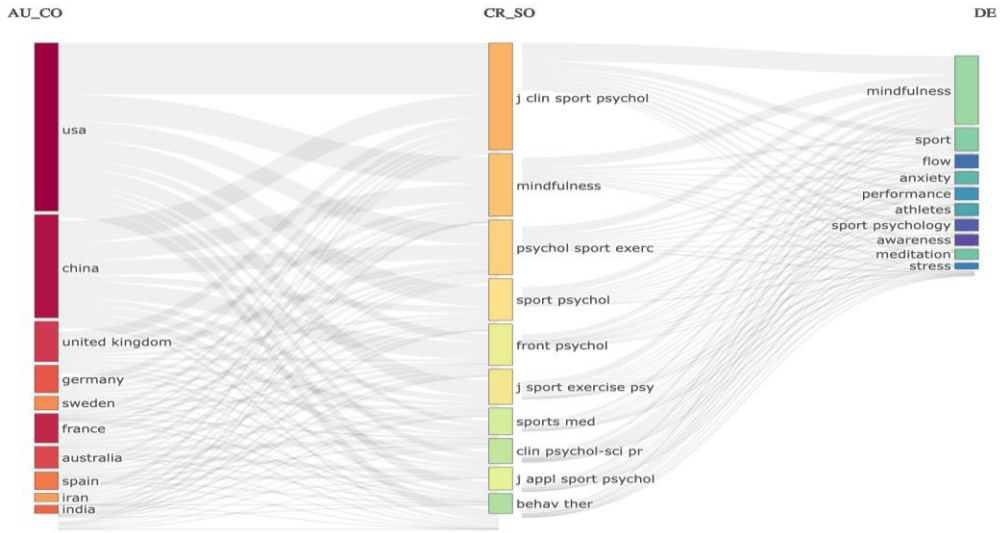

Figure 3. Tree-Fields Plot

Figure 3 provides a comprehensive overview of publications released between 2004 and 2025, showing the countries with the highest number of publications on the left, the most influential journals in the middle, and the keywords that stand out in research on the right. The analysis identified the 10 most prominent elements across the categories of keywords, countries, and journals, revealing that the United States and China stood out in terms of publication counts. The most frequently used keywords were "mindfulness" and "sport". In

addition, it was observed that the United States produced the most publications containing the keyword *"mindfulness"*, while the journal with the most articles published was the *Journal of Clinical Sport Psychology*.

3.2. Documents

The word cloud generated in the study visualises the distribution of recurring terms in publications, revealing the thematic density within the literature. In this visualisation, frequently used words are displayed larger and more prominently, while less frequent words are shown smaller. The word cloud was used to visualise which themes stand out in the literature, conceptual density areas, and research trends.

Figure 4. Word Cloud

In Figure 4, the terms with the highest frequency in the publications were meditation (*f*=37), flow (*f*=33), sport (*f*=22), anxiety (*f*=19) and performance enhancement MSPE (*f*=19). Terms such as intervention (*f*=17), interventions (*f*=15), programme (*f*=10), and follow-up (*f*=5), which pertain to intervention and programme-focused studies, indicate that the field is grounded in experimental and applied research designs. Terms related to psychological variables, such as stress (*f*=15), depression (*f*=11), emotion regulation (*f*=11), and rumination (*f*=4), reveal that interventions also target psychological well-being beyond performance. At the same time, the prominence of measurement and evaluation terms such as validation (*f*=15), scale (*f*=7) and questionnaire (*f*=4) indicates that scale development and validity-reliability studies occupy an important place in the literature. Performance-related terms such as performance (*f*=17), sport performance (*f*=10), athletic performance (*f*=3) and enhancement (*f*=5) indicate that the effectiveness of applications in a sporting context is frequently researched. The word cloud shows that the literature is concentrated on meditation, performance enhancement, psychological health variables, and the MSPE programme, indicating that the field has developed along the axis of performance and mental well-being.

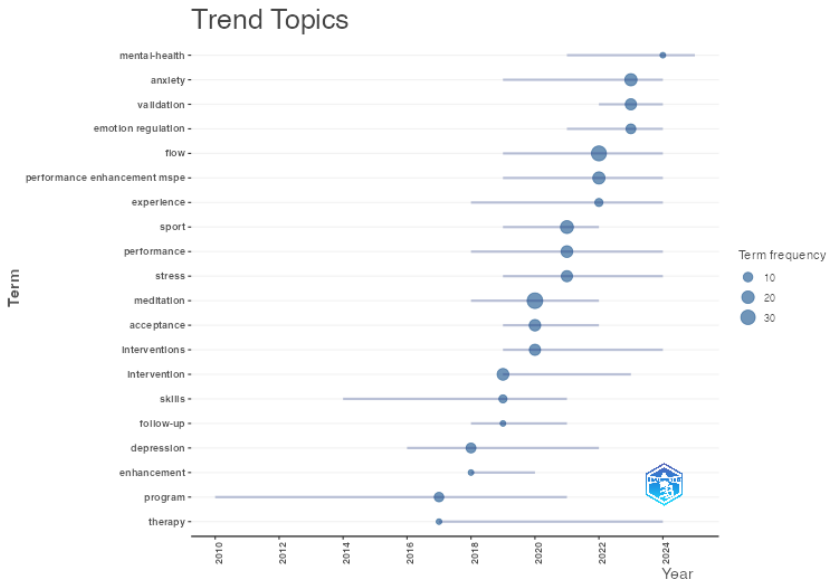

Figure 5. Trends in Author Keyword

The distribution of keywords used in articles published between 2010 and 2025 regarding MSPE and MMTS interventions in the context of performance, mindfulness, and athlete is presented in Figure 5. According to the findings, the most frequently used keywords in the literature are “meditation” (*f*=37) and “flow” (*f*=33). These concepts are followed by “sport” (*f*=22) and “anxiety” (*f*=19), respectively. The Q1 years for the keywords “meditation” and “flow” are 2018 and 2019, respectively, and the median years are 2020 and 2022, respectively. This indicates that research momentum on these topics started early and rose rapidly. Terms such as “sport” and “anxiety” occur relatively frequently, with Q1 and Q3 ranges spread over a wider period of time. This indicates that these topics are a continuing and stable focus of research. The Q1 years for words such as “mental-health”, emotion regulation” and “validation” (2021, 2021 and 2022, respectively) are closer together, while the Q3 years extend to the most recent years, 2024 and 2025. This indicates that these topics have become a relatively new research focus and have rapidly gained importance in recent years. The use of the keyword “mental-health” in 2025 is particularly noteworthy. The use of the term “mental health” over the past year highlights the strong potential for current and future research in this field.

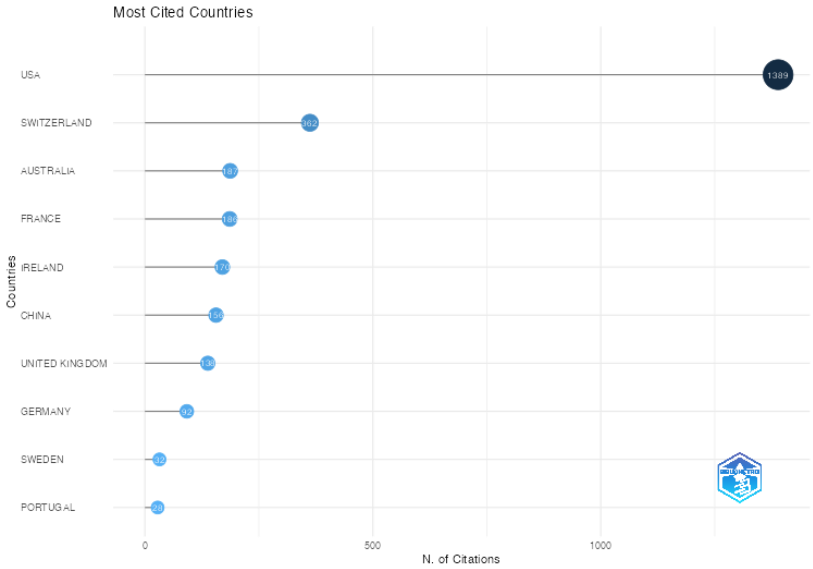

Figure 6. Countries with the highest citation counts (2004–2025)

Figure 6 presents the countries with the highest total citation counts, reflecting their relative citation impact in the field. As a result of citation analyses, the country with the highest number of citations in the studies examined was the United States, with 1.389 citations. This was followed by Switzerland (362 citations), Australia (187 citations), and France (186 citations).

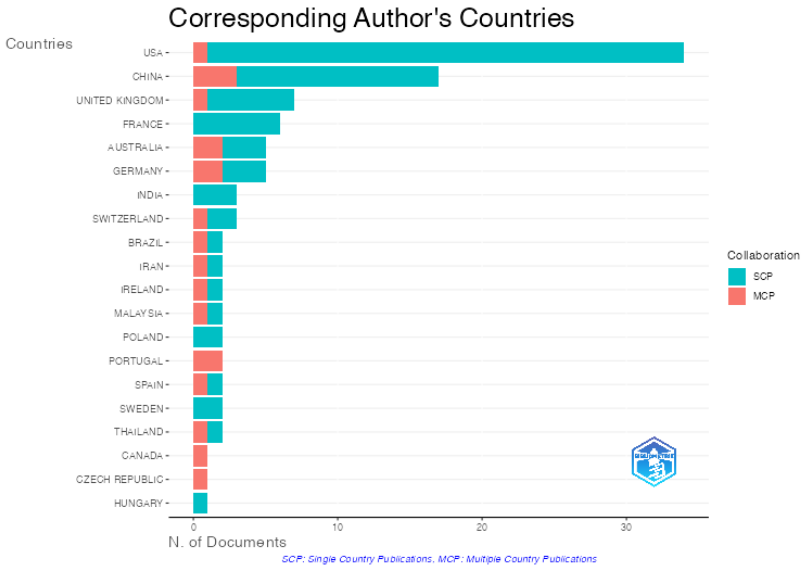

Figure 7. Countries with the Highest Number of Publications (2004–2025)

The findings from the analysis of the country distribution of responsible authors for MSPE and MMTS interventions, in the context of performance, mindfulness, and athlete, are presented in Figure 7. Twenty countries were identified based on the number of publications. The United States produced the most publications in this field of research. The People's Republic of China is included in the multi-country publications (MCP) indicated in red. This finding indicates that

China stands out as the country that most intensively leverages international scientific collaborations to enhance its scientific influence and capacity. The United States stands out in single-country publications (SCP), indicated in green. This situation indicates that the US is an absolute leader in national-level research.

3.3. Sources

The distribution of topics related to MSPE and MMTS interventions in the context of performance, mindfulness and athlete across journals has been analysed within the framework of Bradford's Law.

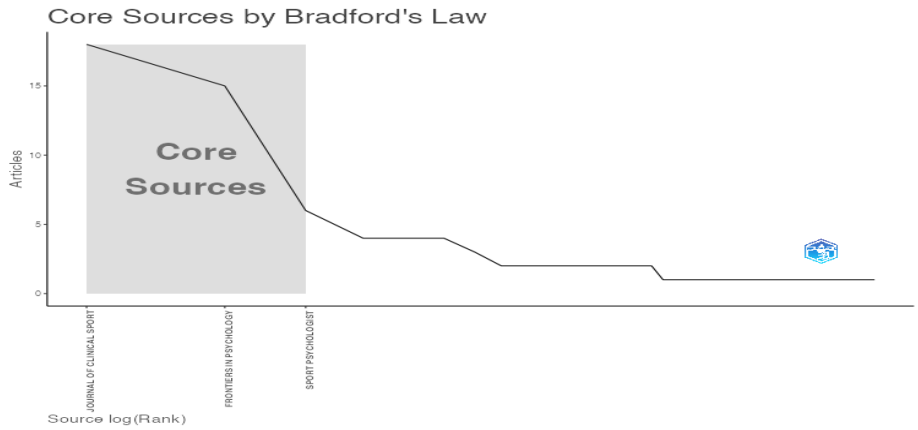

Figure 8. Bradford's Law

As shown in Figure 8, the articles ranked in the top 3 by citation order are located in the core journal zone (Zone 1). Among the 52 journals, 14 are in Zone 2, and 35 are in Zone 3. Journals in Zone 1 constitute approximately 5.77% of all journals, while those in Zone 3 constitute 67.3% of all journals. Articles on MSPE and MMTS interventions in the context of performance, mindfulness and athlete are published in a wide variety of journals, with 109 articles accessed originating from 52 different journals. Between 2004 and 2025, the journal that published the most articles on this subject was the *"Journal of Clinical Sport Psychology"*, published by Human Kinetics Publishers, with 18 articles. This was followed by the journal *"Frontiers in Psychology"*, which published 15 articles. Both journals are in the Q2 quartile and Zone 1.

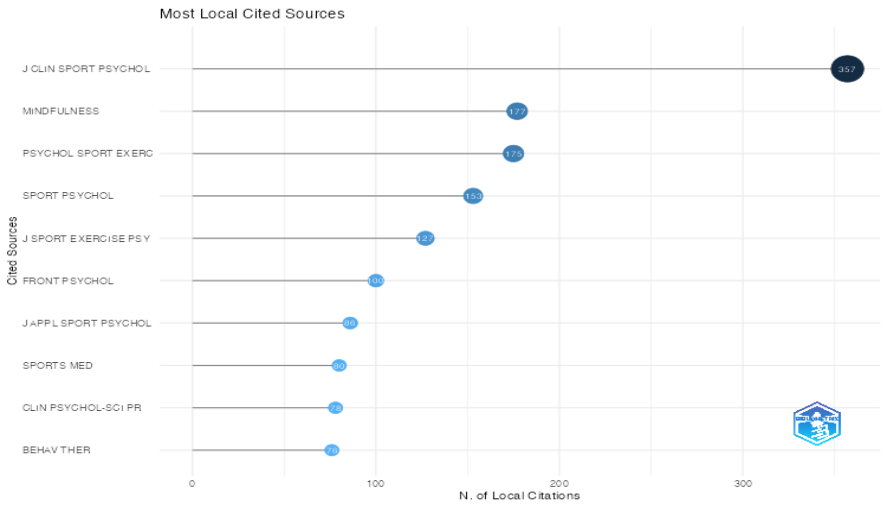

Figure 9. The Most Cited Journals

Figure 9 presents a local citation analysis of sources, identifying the journals that received the highest number of citations in the analyzed dataset. The graph indicates that the *Journal of Clinical Sport Psychology* has the highest total citation count throughout its publication history, emerging as the most influential journal with 357 citations. This is followed by *Mindfulness* (177 citations) and *Psychology of Sport and Exercise* (175 citations). The Sport Psychologist demonstrates a moderate-to-high impact, with 153 citations, while the *Journal of Sport and Exercise Psychology* occupies a similar position with 127 citations. Among the journals with lower citation levels, *Journal of Applied Sport Psychology* (86 citations), *Sports Medicine* (80 citations), *Clinical Psychologist* (78 citations), and *Behavior Therapy* (76 citations) exhibit comparatively smaller citation volumes, indicating more limited influence within the field.

Table 2. Statistics of the Most Influential Journals in the Research

	Journal	NP	TC	h-index	g-index	m-index	PY-start
1	Journal of Clinical Sport Psychology	18	926	13	18	0,764705882	2009
2	Frontiers in Psychology	15	170	8	13	0,888888889	2017
3	International Journal of Sport and Exercise Psychology	4	166	4	4	0,5	2018
4	Sport psychologist	6	197	4	6	0,266666667	2011
5	Journal of Applied Sport Psychology	4	78	3	4	0,6	2021
6	Journal of sport psychology in action	4	30	3	4	0,428571429	2019
7	Journal of Cognitive Enhancement	2	59	2	2	0,222222222	2017
8	Journal of Human Sport and Exercise	2	29	2	2	0,285714286	2019
9	Psychology of Sport and Exercise	3	34	2	3	0,333333333	2020
10	Revista Iberoamericana de Psicología del Ejercicio y el Deporte	2	28	2	2	0,285714286	2019

NP=Total Number of Publications, TC=Total Citations, PY-start=Publication Starting Year

As shown in Table 2, journal productivity was assessed using the total number of publications (NP), whereas citation impact was evaluated using total citations (TC) and citation-based indices. The temporal dimension of journal contributions was captured through the publication starting year (PY-start). In this table, the focus is not on the journals' overall impact but rather on their specific contributions to the relevant research area. The number of publications addressing MSPE and MMTS interventions in the field of performance, mindfulness, and athlete, along with the h-index values of the top 10 most influential journals in this field, have been evaluated as fundamental criteria for identifying the leading journals in the field. The *"Journal of Clinical Sport Psychology"* has the highest number of publications (NP=18) and has received 926 citations. This is followed by *"Frontiers in Psychology"* (NP=15) with 170 citations.

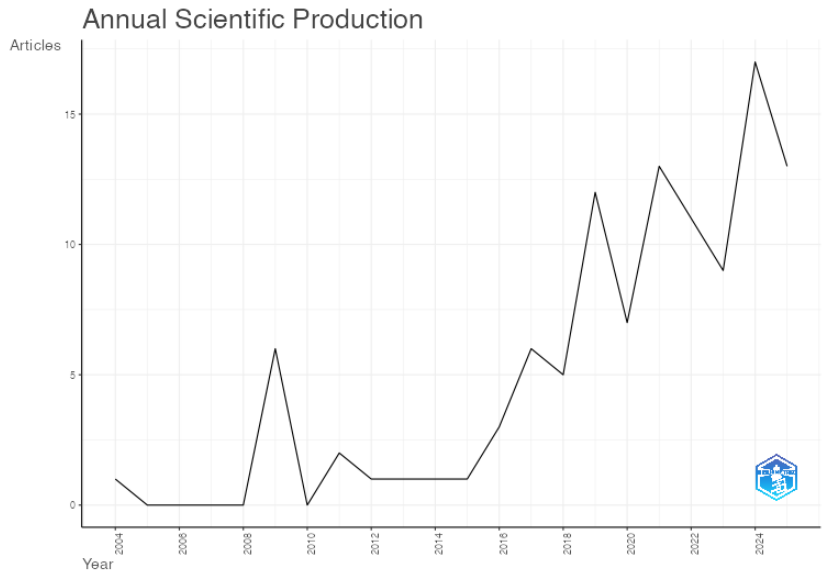

Figure 10. Publication Production Rates by Year

Figure 10 shows a marked increase in academic output on MSPE and MMTS interventions, particularly since 2015, indicating substantial growth in scholarly interest over the past decade. When examining the distribution of publications on MSPE and MMTS interventions in the fields of performance, mindfulness, and athlete in the WoS database by year, it is evident that research on this topic began with a single publication in 2004 and did not reappear until 2008. The number of publications increased in 2009 but remained low until 2015. The number of publications reached 12 in 2019, and a further increase was observed in 2024, with 17 studies. Twelve documents were published between 2004 and 2014, and 97 between 2015 and 2025.

3.4. Conceptual Networks

The network of co-occurring author keywords is presented in Figure 11. Studies related to MSPE and MMTS interventions in the fields of performance, mindfulness, and athlete are organised into eight distinct node clusters. The ellipses seen in each cluster represent the author keywords considered in the analysis. The connections between the ellipses reveal the relationships among the keywords; the thickness of the connections indicates the strength of these relationships.

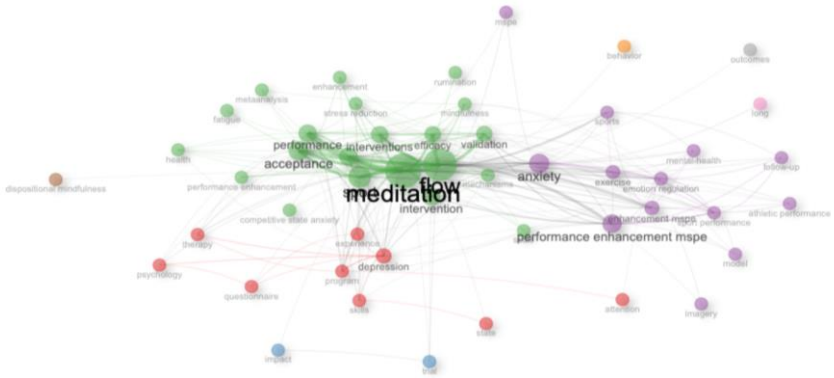

Figure 11. Co-appearance Network of Commonly Used Keywords Across the Publications

The green cluster, which contains the concept of "meditation", stands out for its high centrality value. This indicates that the concept of meditation has the strongest relationships with other keywords in the literature and is central to research themes. Keywords such as "flow", "anxiety", "emotion regulation", and "performance enhancement mspe" stand out with high connection values, representing the field's fundamental sub-themes. In the visual network map, eight distinct clusters are represented: the green cluster by the term "meditation", the purple cluster by "anxiety", and the red cluster by "depression". The green cluster represents a thematic structure that examines the effects of mindfulness-based psychological mechanisms on stress reduction, cognitive processes, and athletic performance. The purple cluster represents a thematic structure comprising studies examining the effects of MSPE-based interventions on performance enhancement, anxiety reduction, and emotion regulation. The connection densities in the network map show a clear centralisation around the concepts of "meditation" and "flow". The high degree of centralisation indicates that these two concepts are highly connected to other key words in the literature. Accordingly, the conceptual pattern across the network indicates that mindfulness-based processes are central to research on both performance and psychological well-being in the field.

3.5. Co-Citation Analyses

To map the intellectual structure of scientific studies on MSPE and MMTS interventions in the fields of performance, mindfulness, and athlete, the common citation relationships between relevant publications were examined using Paper co-citation network analysis. Two main intellectual fields, red and blue, were distinguished. Each node represents the thematic cluster to which it belongs, as indicated by its colour code.

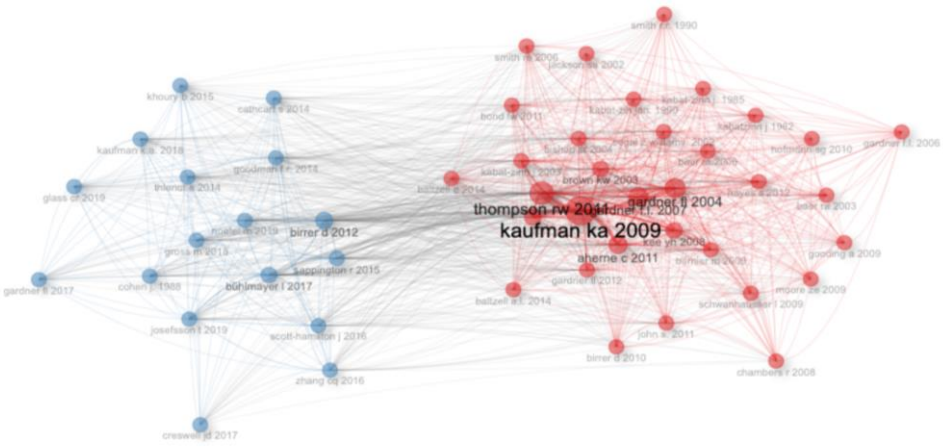

Figure 12. Paper Co-Citation Network

The common citation relationships of publications focusing on MSPE and MMTS interventions in the fields of performance, mindfulness and athlete were examined, and the intellectual structure of the literature was visualised using the network map in Figure 12. The red cluster contains 33 publications. The publication with the highest betweenness value in this cluster was Kaufman K. A. (2009) (74.136288). The blue cluster consists of 17 publications. The publication with the highest betweenness value in this cluster was Sappington R. (2015) (89.619757). This situation plays a key role in connecting two distinct research themes or disciplines, facilitating knowledge diffusion between them. In this context, Kaufman K. A. (2009) and Sappington R. (2015) are of critical importance as points of synthesis or

interdisciplinary transition nodes.

As a result of the PageRank analysis, the research by Kaufman K.A. (2009) and Thompson R.W. (2011), which are in the red cluster, is identified as the most central and influential research, forming the intellectual foundation of the relevant scientific field. The highest PageRank value in the blue cluster belongs to Bühlmayer L. (2017) (0.02391056). The red cluster generally represents a more established body of knowledge in the field. Closeness metrics indicate that the publication by Birrer D. (2012), located in the blue cluster, occupies a central position in knowledge diffusion within the network and exhibits the highest potential reach across nodes. Despite comprising a relatively smaller number of members, the blue cluster indicates that the intellectual structure is positioned closer to the network's central locus of knowledge diffusion.

Table 3. The 10 most cited authors and their publications

Authors	Journal	Article	Year	LCS	GCS
Kaufman K.A. et al.	Journal of Clinical Sport Psychology	Evaluation of mindful sport performance enhancement (MSPE): A new approach to promote flow in athletes	2009	65	193
De Petrillo L.A. et al.	Journal of Clinical Sport Psychology	Mindfulness for long-distance runners: An open trial using mindful sport performance enhancement (MSPE)	2009	29	98
Bernier M. et al.	Journal of Clinical Sport Psychology	Mindfulness and acceptance approaches in sport performance	2009	25	139
Moore Z. E.	Journal of Clinical Sport Psychology	Theoretical and empirical developments of the mindfulness-acceptance-commitment (MAC) approach to performance enhancement	2009	11	75
Schwanhausser L.	Journal of Clinical Sport Psychology	Application of the mindfulness-acceptance-commitment (MAC) protocol with an adolescent springboard diver	2009	14	57
Thompson R. W. et al.	Journal of Clinical Sport Psychology	One-year follow-up of mindful sport performance enhancement (MSPE) with archers, golfers, and runners	2011	48	111
Aherne C.	The sport psychologist	The effect of mindfulness training on athletes' flow: An initial investigation	2011	32	151
Birrer D. et al.	Mindfulness	Mindfulness to enhance athletic performance: Theoretical considerations and possible impact mechanisms	2012	33	181
Baltzell A.	Journal of Clinical Sport Psychology	A qualitative study of the mindfulness meditation training for sport: Division I female soccer players' experience	2014	11	36
Sappington R. & Longshore K.	Journal of Clinical Sport Psychology	Systematically reviewing the efficacy of mindfulness-based interventions for enhanced athletic performance	2015	28	74

LCS-Local Citation Score; GCS-Global Citation Score

The ten most frequently cited authors and their associated publications are presented in Table 3. Among studies in the field of mindfulness-based sports performance interventions, the article titled *"Evaluation of Mindful Sport Performance Enhancement (MSPE): A New Approach to Promote Flow in Athletes"* published by Kaufman K.A. and colleagues in 2009, is identified as having the highest impact values in the field. It is the most cited study among the

analysed articles and among all publications in Web of Science. Similarly, studies such as De Petrillo L.A. (LCS = 29; GCS = 98), Bernier M. et al. (LCS = 25; GCS = 139) and Aherne C. (LCS = 32; GCS = 151) indicate that 2009 was a period of intense production and theoretical framework development in mindfulness-based sports performance research. The relatively lower LCS and GCS values in studies published in 2014 and 2015 (e.g., Baltzell A.: LCS = 11; GCS = 36) may reflect that these articles are more recent and have received fewer citations within a sufficient timeframe.

3.6. Social Networks

The collaboration network among authors is presented in Figure 13. The analysis was conducted on a 50-cell grid, and it was determined that authors working in the field were grouped into thirteen distinct clusters. Forty-three authors with at least two co-publications were included in the study. In the visualisation, each node represents an author, and the lines between nodes indicate co-authorship relationships. The colours of the nodes represent different clusters formed based on the authors' tendencies to collaborate.

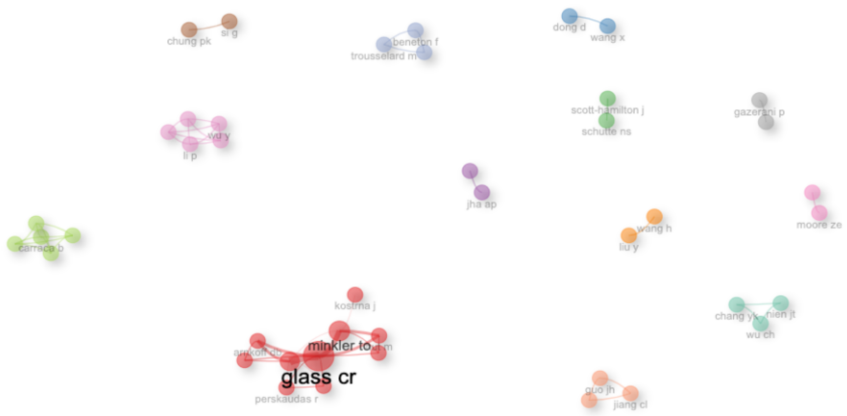

Figure 13. Author Collaboration

The red cluster is represented by Glass C.R., Minkler T.O., Kaufman K.A., Arnkoff D.B., Hut M., De Petrillo L.A., Flannery C.B., Kostrna J., Perskaudas R., and Spears C.A. The cluster's broad structure and the large number of authors indicate the intensity of collaboration within this group. As shown in Figure 13, Glass C.R. is at the centre of the network; other clusters exhibit patterns of collaboration within smaller groups. The red cluster constitutes the core of the network, and scientific production in the field is largely shaped by the interactions of this central research group.

Figure 14 presents the results of the inter-institutional collaboration analysis conducted to examine the collaboration models of the institutions involved in the MSPE and MMTS interventions in the context of performance, mindfulness and athlete.

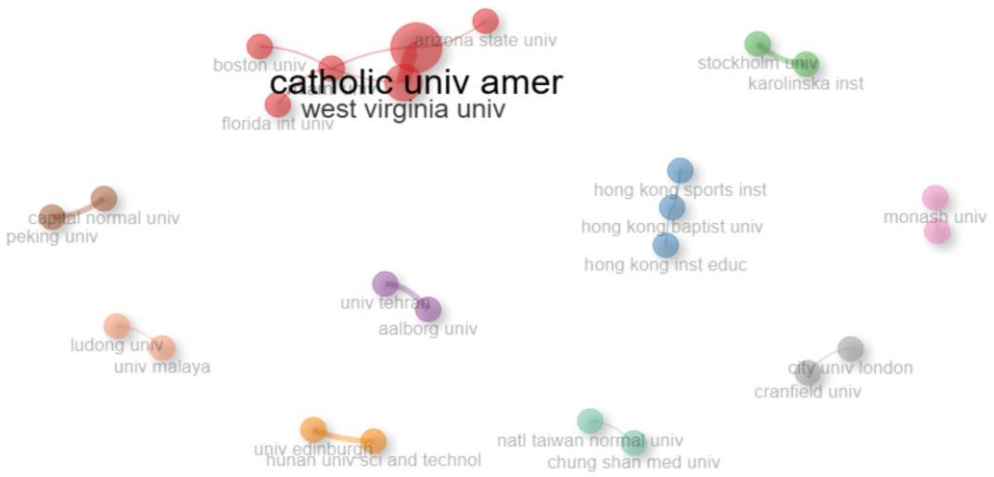

Figure 14. Institutional Collaboration

When examining the bibliometric collaboration network, it is observed that institutions cluster into around 10 clusters and mostly collaborate in pairs or small subgroups. The Red cluster is the most central and densely connected group in the network; in particular, the Catholic University of America occupies the centre of the collaboration structure with high betweenness (4), high PageRank (0.0685) and high closeness value (0.1429), forming connections with West Virginia University, Boston University, Miami University, Florida International University and Arizona State University. This indicates that institutions within the same cluster have developed a stronger collaborative network. The blue cluster has a smaller-scale collaborative structure consisting of reciprocal connections between Hong Kong Baptist University, Hong Kong Institute of Education, and Hong Kong Sports Institute. These institutions are seen to have established direct relationships with each other. *The Karolinska Institute* and *Stockholm University*, located in the green cluster, form a bilateral collaboration cluster. Similarly, the *University of Tehran* and *Aalborg University*, located in the purple cluster, the orange cluster (*Hunan University of Science and Technology – University of Edinburgh*), the brown cluster (*Peking University – Capital Normal University*), the pink cluster (*Monash University – University of South Australia*), the grey cluster (*City University London – Cranfield University*), light green cluster (*National Taiwan Normal University – Chung Shan Medical University*) and light red cluster (*Ludong University – University of Malaya*) also exhibit bilateral institutional structures that connect directly with each other in a similar manner. These data show that the collaboration network is structured more as bilateral partnerships and small clusters than as a broad, multi-centred international network. Across the network, a collaboration structure emerges where a large group of institutions is located at the centre, surrounded by small, independent bilateral clusters.

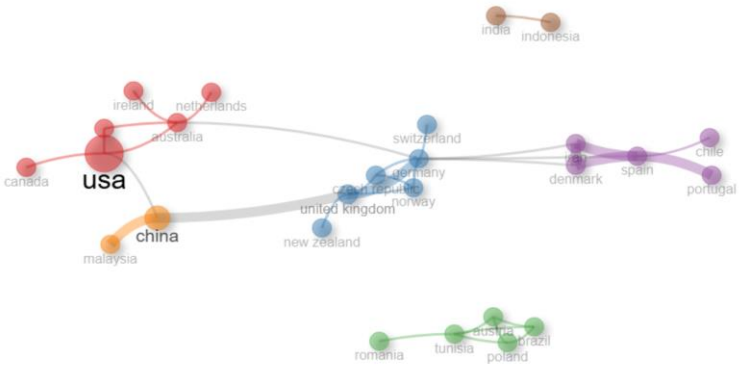

Figure 15. International Collaboration

Figure 15 depicts the country-level cooperation network comprising six clusters. According to the analysis results, the United States, located in the red cluster of the cooperation network among countries, is the most central country, with a high number of connections and network metrics, and it shows strong relationships with Australia, Ireland, Canada, and the Netherlands, which are in the same cluster. Within this cluster, Australia plays an important intermediary role with a high betweenness value (58.33).

The United Kingdom, Germany, Switzerland, the Czech Republic, Norway, and New Zealand form the blue cluster; Germany, in particular, is at the centre of intra-cluster connections with a high betweenness value (93.33). In the green cluster, Poland, Brazil, Tunisia, Romania, and Austria have limited but balanced connections, with closeness values indicating that these countries are accessible within sub-networks. The purple cluster includes Spain, Portugal, Denmark, Iran and Chile, with Spain playing an intermediary role in intra-cluster interactions with a high betweenness value (33). China and Malaysia are in the orange cluster, while India and Indonesia are in the brown cluster, showing bilateral connections. China, in particular, plays a central role within its own cluster, with a betweenness value of 24.66.

3.7. Authors

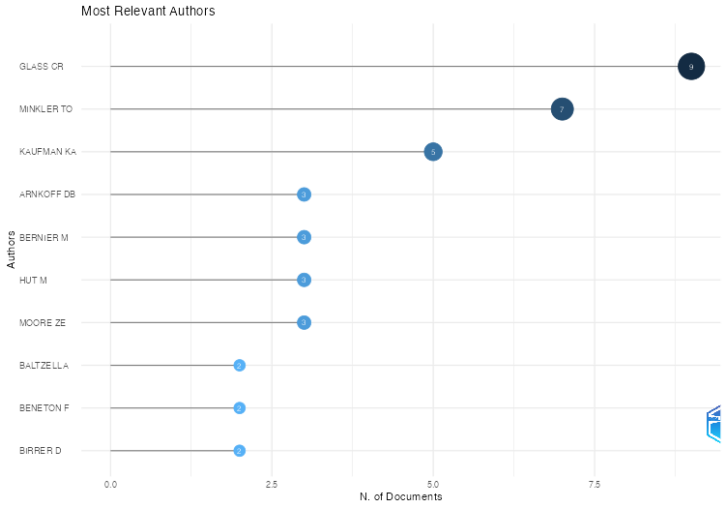

Figure 16. The Most Productive Author

Upon examination of Figure 16, it is determined that Glass C. R. is the author with the most publications among the articles within the scope of the research. Minkler T. O. ranks second in terms of the number of articles, and Kaufman K. A. ranks third. This distribution indicates that publication output in the field is concentrated among a few authors, who occupy central positions in the field's development.

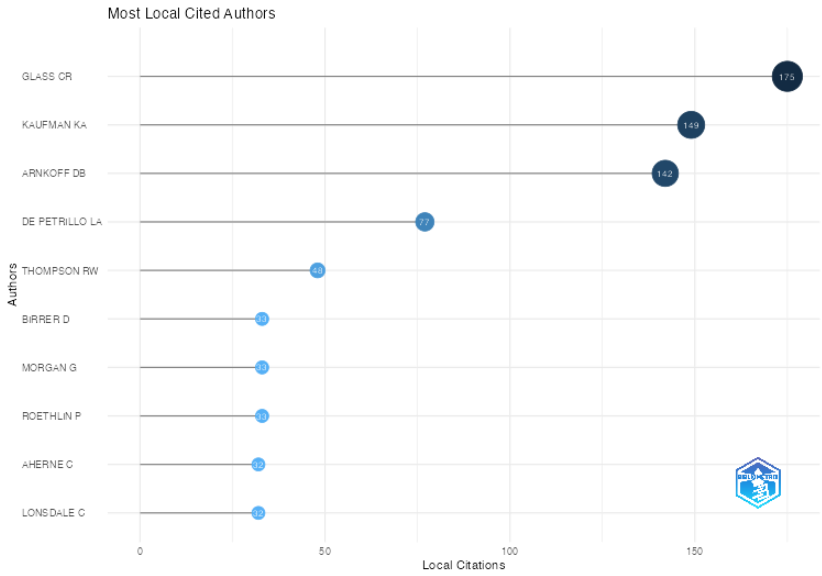

Figure 17. The Author with The Highest Number of Citations

Figure 17 presents the citation counts for the authors relevant to the research scope. The findings indicate that the author with the highest number of citations within the scope of the research is Glass J. R., with 175 citations. Kaufman K. A. ranks second with 149 citations, followed by Arnkoff D. B. in third place. This result suggests that these authors are key contributors shaping the field's intellectual structure and that the scientific interaction network in the literature is largely concentrated around their contributions.

3. Discussion and Conclusion

This bibliometric analysis comprehensively delineates the structure, trends, and intellectual patterns of scientific production on MSPE and MMTS interventions within the context of performance, mindfulness, and athlete between 2004 and 2025. The findings indicate a marked growth in the field over the past decade, with a rapid increase in publication output, particularly after 2015. A total of 109 documents were identified on the topic, the majority of which are journal articles, produced by 422 contributing authors. This underscores the expansion of the scholarly collaboration network related to MSPE and MMTS interventions.

The word cloud and keyword co-occurrence analyses reveal that concepts such as “meditation”, “flow”, “anxiety”, and “performance enhancement mspe” hold central positions in the literature, demonstrating that research themes cluster predominantly around these psychological components. The keyword structure shows that scholarly output largely focuses on meditation-based mechanisms, anxiety regulation, emotion regulation, performance enhancement, and psychological well-being. The high centrality value of “meditation” further indicates that this concept serves as a principal axis in MSPE and MMTS research.

Citation analyses indicate that the United States is the leading country in both total citations and single-country publications, whereas China stands out in multi-country publications, highlighting its central role in international collaborations. These findings clearly reveal the dynamics of national scientific productivity and global cooperative networks within the field.

The Bradford's Law distribution analysis shows that publications related to the topic appeared across 52 different journals, with a relatively small set forming the core zone. Within this core, the *Journal of Clinical Sport Psychology* and *Frontiers in Psychology* were identified as prominent sources. The *Journal of Clinical Sport Psychology* exhibits by far the highest number of local citations, indicating that it occupies a core position within the MSPE- and MMTS-focused literature and functions as a central source in intra-field citation practices. This journal is followed by *Mindfulness*, *Psychology of Sport and Exercise*, and *Sport Psychology*, which, despite receiving comparatively fewer local citations, emerge as complementary and supporting sources contributing to the development of the field's conceptual and theoretical framework.

The results of the bibliometric analyses illustrate the production dynamics, intellectual structure, and collaborative patterns of the literature on MSPE and MMTS interventions within the domains of performance, mindfulness, and sport. Among the examined documents, Glass C. R. was identified as the author with the highest publication output, followed by Minkler T. O. and Kaufman K. A., suggesting that scholarly production is concentrated around specific researchers who hold influential positions in shaping the field. Citation analyses further revealed that Glass J. R. received the most citations, followed by Kaufman K. A. and Arnkoff D. B., indicating that these authors occupy central roles in the intellectual network and serve as key contributors to the field's conceptual development. At the document level, the study by Kaufman et al. (2009), titled *"Evaluation of Mindful Sport Performance Enhancement (MSPE): A New Approach to Promote Flow in Athletes,"* was identified as the most cited publication among the analyzed documents as well as across the Web of Science.

Collaboration network analyses demonstrate that institutional connections are organized not as a broad, multi-centred system but rather through small-scale, dyadic collaborations. Within this structure, the Catholic University of America occupies a central position. Its connections with West Virginia University, Boston University, Miami University, Florida International University, and Arizona State University reflect a cohesive cluster of institutional collaborations.

Publication and citation analyses indicate that the field is shaped by a few leading researchers, whereas collaborative networks develop predominantly through limited, dyadic partnerships. This pattern suggests that research on mindfulness-based interventions in performance and sport is organised around distinct thematic and institutional focal points. Overall, the findings demonstrate that MSPE and MMTS are increasingly prominent within the academic literature and make substantial contributions to the conceptual and methodological development of mindfulness-based practices in performance psychology and sport.

These findings should be interpreted in light of several methodological and coverage-related limitations. First, the data source was restricted to Web of Science searches, thereby excluding relevant studies indexed in Scopus, PubMed, SPORTDiscus, PsycINFO, Google Scholar and MEDLINE. This limitation may have constrained the comprehensive representation of MSPE and MMTS intervention research across the broader scholarly landscape. Second, only English-

language documents were included in the dataset, potentially excluding studies published in other languages and introducing language bias. In addition, as the dataset was finalised on 24 October 2025, publications appearing after this date were not captured in the analysis. Another limitation concerns the methodological approach, which relied exclusively on bibliometric techniques conducted via the Biblioshiny interface. Although this approach effectively captures relational structures, thematic patterns, and bibliometric indicators, it does not encompass content-based evaluations of intervention methodologies, sample characteristics, or empirical findings. Additionally, because the search terms were limited to specific intervention names and related terminology, some mindfulness-based sport interventions that do not explicitly reference MSPE or MMTS may have been omitted, so the analysis reflects only the portion of the literature shaped by these selected keywords.

Adopting a systematic and integrative perspective, this bibliometric analysis examines the literature on Mindful Sport Performance Enhancement (MSPE) and Mindfulness Meditation Training for Sport (MMTS) interventions to elucidate the production dynamics, conceptual orientations, and collaboration structures of the field. The study is of particular significance as one of the first comprehensive bibliometric investigations to focus specifically on mindfulness-based interventions developed for sport contexts. In this respect, the analysis maps the field's intellectual structure and developmental trajectories, offering a guiding framework for researchers and practitioners. Future research is encouraged to integrate bibliometric analyses with content analyses, systematic reviews, and meta-analytic approaches. Such multi-method designs would enable deeper insights into intervention effectiveness, sample characteristics, implementation processes, and conceptual and relational structures. By systematically documenting the current state of the field, the present study provides a robust reference point for future theoretical, empirical, and applied research.

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