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2010–2025 Yılları Arasında Spor Psikolojisi ve Beyin İlişkili Çalışmaların Bibliyometrik Analizi (Web Of Science)

Bibliometric Analysis of Sports Psychology and Brain Related Studies Between 2010–2025 (Web Of Science)

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Abstract: The purpose of this research is to examine the development trends of scientific studies on the relationship between sports psychology and the brain in the last 15 years using the bibliometric analysis method. In the literature, it is seen that brain-based approaches are integrated into sports psychology research, especially through concepts such as mental fatigue, motivation, attention, self-regulation and neuroplasticity. These studies provide important contributions both to increase sports performance and to support psychological well-being. In this context, mapping the connections established between sports psychology and brain functions provides an important basis for interdisciplinary research. Methods: This study covers the bibliometric analysis of academic publications published between 2010 and 2025 with the keywords “sport psychology” and “brain” in the Web of Science Core Collection database. The search was conducted by including SSCI, SCI-EXPANDED, ESCI, BKCI-SSH, CPCI-SSH and CPCI-S indexes. A total of 1,162 publications were examined and the obtained data were analyzed using VOSviewer software in terms of parameters such as keyword network, author collaboration map, country and institution distributions. Results: It was determined that the majority of the publications examined were published in the last 5 years; the most publications were from the United States, the United Kingdom and China. In the keyword analysis, concepts such as "mental fatigue", "neuroplasticity", "cognition" and "performance" were seen to be prominent. In addition, network structures where intensive collaborations between authors and institutions were formed were determined. Conclusion: This study, conducted using bibliometric analysis, systematically maps the basic concept clusters, collaboration networks, and publication trends in the field by revealing the evolutionary structure of sports psychology and brain-related research. The results provide a strategic guide for researchers in directing future studies.

Structured Abstract: Sports psychology has evolved into a multidisciplinary research domain that bridges cognitive neuroscience and performance science. With the increasing inclusion of brain-based approaches, recent literature emphasizes constructs such as attention, executive functioning, mental fatigue, neuroplasticity, and decision-making as central to athletic performance. This study aims to systematically examine the development, trends, and structural features of academic publications focusing on the intersection of sports psychology and brain research between 2010 and 2025. Through a bibliometric analysis, the research seeks to

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identify influential themes, author networks, institutional collaborations, and publishing trends to guide future research and practical applications.

A document-based bibliometric method was employed, analyzing academic publications retrieved from the Web of Science Core Collection database. The inclusion criteria focused on studies indexed in SSCI, SCI-EXPANDED, ESCI, BKCI-SSH, CPCI-SSH, and CPCI-S, and filtered using the keywords "sport psychology" and "brain." A total of 1,162 publications were identified between 2010 and 2025. VOSviewer (version 1.6.19) software was used to perform co-authorship, keyword co-occurrence, and institutional network analyses. Descriptive statistics such as publication counts by year, country of origin, and document types were calculated. Keyword clustering, citation frequency, and thematic development maps were also generated using supplementary Excel and Python-based tools. The bibliometric approach was chosen for its ability to offer quantitative insights into the intellectual and structural dynamics of a specific research field.

The analysis revealed a significant increase in research output after 2020, with 2024 being the most productive year in terms of publication count. This trend coincides with the heightened interest in mental health and cognitive functioning in post-pandemic sports science. In total, the 1,162 publications received 17,794 citations, with 2023 being the peak year for citation frequency. Most publications were empirical research articles (n = 239), followed by review papers (n = 68), indicating a shift toward theory consolidation and critical reflection on neurocognitive models in sports. The keyword co-occurrence analysis highlighted frequently used terms such as "mental fatigue," "executive function," "brain plasticity," "self-regulation," and "cognitive performance." These indicate a strong focus on the cognitive and neurobiological mechanisms underlying athletic behavior. Thematic evolution suggests that research has expanded from classical motivation and anxiety constructs toward more neurocognitive and integrative models of human performance. Geographical analysis revealed that the United States, the United Kingdom, and China lead the field in terms of publication volume, author productivity, and institutional output. Collaboration networks identified core research hubs including universities in Germany, Canada, and Australia. The representative author collaboration map showed that top contributors often work in interdisciplinary teams involving psychologists, neuroscientists, and exercise physiologists. Regarding publication types, while empirical studies dominate, there is an upward trend in conference proceedings, book chapters, and systematic reviews, reflecting growing theoretical maturity and cross-disciplinary interest. Only one publication was marked as "early access," suggesting that the field continues to produce cutting-edge studies pending full publication.

This bibliometric review of sports psychology and brain-focused research over a 15-year period demonstrates a dynamic shift in the field toward neurocognitive conceptualizations of sports performance. The post-2020 surge in publication and citation activity suggests that global challenges such as the COVID-19 pandemic may have acted as a catalyst for interdisciplinary exploration into brain-health-performance connections. The clustering of terms around executive function, fatigue, and plasticity illustrates the increasing importance of cognitive mechanisms not only in performance optimization but also in psychological resilience and well-being.

The results of the study support the argument that sports psychology is no longer a domain concerned solely with performance enhancement through mental training but is also becoming a core area for understanding brain-behavior relationships under physical and emotional stress. The convergence of neuroscience and sports science yields fertile ground for the development of more personalized, evidence-based interventions in both elite sports and recreational physical activity settings. Moreover, the emergence of new themes and collaboration structures reflects the need for more integrative and technologically supported methodologies. Researchers are increasingly relying on neuroimaging tools (e.g., fMRI, EEG), real-time cognitive assessment, and digital monitoring technologies to explore the neural correlates of performance.

Keywords: Sports Psychology, Brain, Bibliometric Analysis

Öz: Bu araştırmanın amacı, spor psikolojisi ile beyin ilişkisini konu alan bilimsel çalışmaların son 15 yıl içerisindeki gelişim eğilimlerini bibliyometrik analiz yöntemiyle incelemektir. Literatürde, beyin temelli yaklaşımların özellikle zihinsel yorgunluk, motivasyon, dikkat, öz düzenleme ve nöroplastisite gibi kavramlar üzerinden spor psikolojisi araştırmalarına entegre edildiği görülmektedir. Bu çalışmalar, hem spor performansını artırmak hem de psikolojik iyilik hâlini desteklemek amacıyla önemli katkılar sunmaktadır. Bu bağlamda, spor psikolojisi ile beyin işlevleri arasında kurulan bağlantıların haritalanması, disiplinler arası

araştırmalar için önemli bir zemin hazırlamaktadır. Materyal ve Yöntem: Bu çalışma, Web of Science Core Collection veri tabanında yer alan, "sport psychology" ve "brain" anahtar kelimeleri ile 2010–2025 yılları arasında yayımlanan akademik yayınların bibliyometrik analizini kapsamaktadır. Tarama, SSCI, SCI-EXPANDED, ESCI, BKCI-SSH, CPCI-SSH ve CPCI-S indekslerini içerecek şekilde yapılmıştır. Toplam 1.162 yayın incelenmiş, elde edilen veriler VOSviewer yazılımı kullanılarak anahtar sözcük ağı, yazar işbirliği haritası, ülke ve kurum dağılımları gibi parametreler doğrultusunda analiz edilmiştir. Bulgular: İncelenen yayınların büyük çoğunluğunun son 5 yıl içerisinde yayımlandığı; en fazla yayının Amerika Birleşik Devletleri, Birleşik Krallık ve Çin kaynaklı olduğu tespit edilmiştir. Anahtar kelime analizlerinde "mental fatigue", "neuroplasticity", "cognition" ve "performance" gibi kavramların ön plana çıktığı görülmüştür. Ayrıca, yazarlar ve kurumlar arası yoğun işbirliklerinin oluştuğu ağ yapıları belirlenmiştir. Sonuç: Bibliyometrik analiz yöntemiyle yapılan bu çalışma, spor psikolojisi ve beyin ilişkili araştırmaların evrimsel yapısını ortaya koyarak, alandaki temel kavram kümelerini, işbirliği ağlarını ve yayın eğilimlerini sistematik biçimde haritalamaktadır. Elde edilen sonuçlar, araştırmacılar için gelecekteki çalışmaların yönlendirilmesinde stratejik bir kılavuz niteliğindedir.

Anahtar Kelimeler: Spor Psikolojisi, Beyin, Bibliyometrik Analiz

Introduction

The interaction between sport psychology and neuroscience is becoming increasingly important in contemporary sports science. In particular, the performance outcomes of elite athletes are considered not only through physical impact but also through medical treatments. Recent advances have demonstrated that neurocognitive domains such as attention, executive functions, decision-making, and reaction time significantly impact athletic success (Zimmer et al., 2023). Recent research demonstrates that sports have long-term effects on functional connectivity and structural plasticity in the brain. For example, Fonseca et al. (2023) noted that elite athletes develop more efficient brain networks for motor planning and executive functions, providing a sport-specific cognitive advantage. These findings demonstrate that brain-based cognitive processes are critical to sports and cannot be ignored.

However, there are still limited studies in the literature that present holistic models that directly relate brain functions to variables specific to sports psychology (da Silva et al., 2023).

Sports psychology is a multidisciplinary field that examines the relationships between individuals' athletic performance, mental processes, and behavior. In recent years, with the increase in neuroscientific approaches in the context of sports psychology, the link between the structural and functional characteristics of the brain and athletic success has become more visible (Yarrow et al., 2009). In particular, the effects of cognitive functions such as attention, memory, decision-making, motor control, and emotional regulation on sports performance stand out as important areas of research in both individual athletes and team sports (García-González et al., 2020). In this context, sports psychology is not limited to topics such as mental endurance, motivation, and anxiety management, but also includes cognitive processes directly related to the functioning of the brain.

The integration of brain-related studies into sports psychology contributes particularly to the understanding of the neurocognitive basis of performance. For example, studies using neuroimaging techniques such as functional magnetic resonance imaging (fMRI) have revealed that attention and decision-making processes are carried out in a more optimized manner in elite athletes (Park et al., 2015). Such findings allow both the restructuring of training programs according to neuropsychological foundations and the more systematic consideration of the contribution of cognitive skills to athletic success. In this respect, the intersection of sports psychology and brain-based research offers important scientific and applied outputs in areas such as performance enhancement, mental health and cognitive development.

Sports psychology is a branch of science that examines the mental, emotional and motivational structures of individuals that emerge during sports and physical activity processes. This field was developed to support both the performance enhancement of competitive athletes and the general psychological well-being of individuals. In recent years, sports psychology has begun to gain a more in-depth perspective, especially with brain-based approaches. It is increasingly accepted that brain functions, especially processes such as attention, decision-making, stress management, motor control and cognitive flexibility, directly contribute to performance in sports (Yarrow, Brown & Krakauer, 2009). In this context, the integration between sports psychology and neuroscience has given birth to an interdisciplinary research ecosystem.

In today's world where scientific knowledge production is rapidly increasing, systematic classification of these studies, analysis of their trends and identification of research gaps are of great importance. Such analysis not only enables the description of the current situation in academic literature but also enables the development of strategic recommendations for future research. For this purpose, bibliometric analyses provide a powerful method for mapping the structure of the field and identifying the most influential authors, institutions, and key concepts (Donthu et al., 2021). These analyses contribute to understanding the growth potential of research areas, international collaborations, and publication dynamics. The relationship between sports psychology and brain function has become an important research topic, both for improving performance and for understanding cognitive processes. It is now emphasized that not only physical ability but also cognitive components such as attention, reaction time, decision-making, and emotional regulation play a critical role in athletic success (Vestberg et al., 2021).

Neurocognitive functions, in particular, appear to differ significantly between elite and amateur athletes, and these differences are directly reflected in performance (Di Menna et al., 2023). Neuroimaging studies indicate that brain regions involved in motor skill learning can be shaped specifically by sport, necessitating closer examination of the interaction between sports psychology and neuroscience (Kim et al., 2022). Furthermore, the development of integrative models encompassing higher-level processes such as executive functions, attentional control, and emotional regulation deepens theoretical explanations in the field (Jacobson & Matthaeus, 2021).

However, studies in this area are limited and mostly focus on one-way correlations. Therefore, research based on current models and theories examining the relationship between variables specific to sports psychology and cognitive structures of the brain is needed.

In this study, bibliometric analysis of academic publications with the themes of “sports psychology” and “brain”, which are included in the Web of Science Core Collection database between 2010 and 2025 and scanned in SSCI, SCI-EXPANDED, ESCI, BKCI-SSH, CPCI-SSH and CPCI-S indexes, was conducted. In the analysis process, parameters such as distribution of publications by year, citation counts, keyword clusters, author collaborations, country and institution density were evaluated. The VOSviewer program was used in the analysis of the data and the findings were also presented graphically.

This study aims to present a resource that will guide researchers and policy makers by revealing the developmental trends of the field. The results obtained will provide significant contributions to understanding the level of integration of sports psychology into brain-based research and to guide future studies in this field.

Method

In this study, document analysis technique was used. The data source of the research consists of scientific publications published on sports psychology and brain-related topics. In this context, publications in the Clarivate Analytics Web of Science Core Collection database and scanned in SSCI (Social Sciences Citation Index), ESCI (Emerging Sources Citation Index), SCI-EXPANDED

(Science Citation Index Expanded), BKCI-SSH (Book Citation Index–Social Sciences & Humanities), CPCI-SSH (Conference Proceedings Citation Index–Social Sciences & Humanities) and CPCI-S (Conference Proceedings Citation Index–Science) indexes were included in the analysis.

In the first stage of the research, keywords suitable for the scope of the study were determined and a search was conducted under the title of "TOPIC" with terms such as "sport psychology" and "brain". As a result of the search, a total of 1,162 publications published between the years 2010–2025 were identified. The data of these publications (Publication/Citation Network Map, Representative Interaction Network among Top 30 Authors, Network Map of Types in Bibliometric Analysis, Interaction Network among Institutions (Top 30 Institutions) were exported in .csv and .xls formats. The dataset was evaluated using VOSviewer (version 1.6.19) software for bibliometric analysis. VOSviewer was used to generate author collaborations, country-institution distributions, keyword clusters and thematic development maps. Additionally, some graphical analyses and word cloud visualizations were supported with the help of Microsoft Excel and Python-based scripts.

The reason why the bibliometric analysis technique is preferred is that it provides the opportunity to systematically evaluate the distribution structure of publications in a particular research field, key concept clusters, collaboration patterns between authors and institutions, and time-dependent research trends (Donthu et al., 2021). This technique enables comprehensive mapping of existing literature and strategic insights into the developmental dynamics of the field. It also provides a powerful method for identifying structural patterns of scientific production, revealing collaboration networks, and identifying research gaps (Ellegaard & Wallin, 2015; Šukys et al., 2019).

Ethics Committee Approval

This study does not require ethics committee approval as it only includes analysis of publicly available scientific publications. No personal data was used and the identities of the researchers were not directly interfered with.

Findings

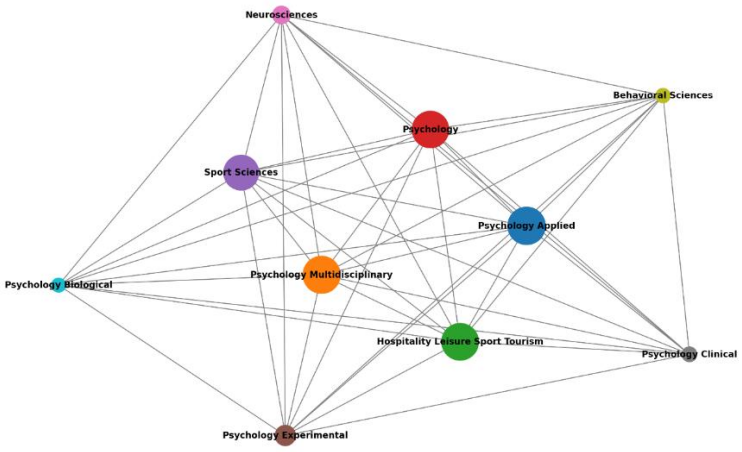

Figure 1. Network Map by Research Areas

The image above shows the network map of sports psychology and brain-related studies by research area. The network structure represents the potential level of relationship and collaboration between research areas in the Web of Science database. In this study, the distribution of 1162

scientific publications related to "sports psychology" and "brain", scanned in the Web of Science database between 2010 and 2025, was examined according to research fields. As a result of the analysis, it is seen that the most publications were made in the field of Psychology (n=278). This field is followed by Psychology Applied (n=205), Psychology Multidisciplinary (n=164) and Sport Sciences (n=147). While there are 113 publications in the field of Neurosciences, Psychology Clinical (Clinical Psychology) attracts attention with 78 publications. In addition, a significant number of publications were identified in the fields of Psychology Experimental (n=64), Psychology Biological (n=46), Behavioral Sciences (n=37) and Hospitality Leisure Sport Tourism (n=30).

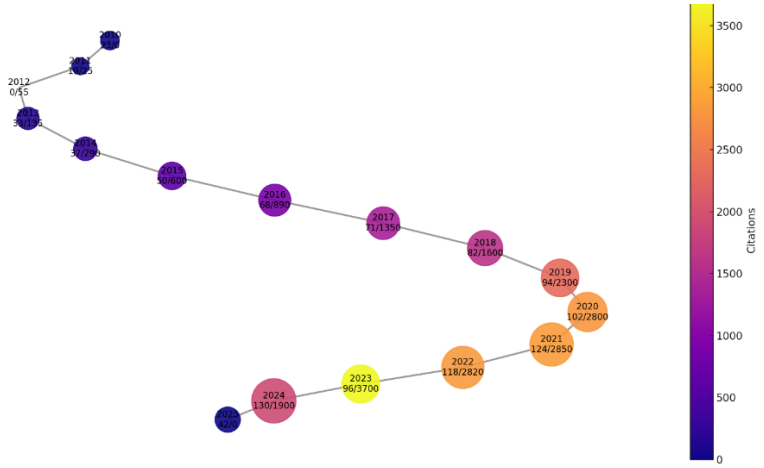

Figure 2. Publication/Citation Network Map of the Sports Psychology and Brain-Related Studies (2010–2025)

Among the publications examined, the highest scientific production was realized in 2024, with a total of 130 publications made in this year. However, the highest number of citations was reached in 2023, with 3700 citations recorded in this year. A total of 1162 studies published between 2010 and 2025 have had a significant scientific impact on the literature, receiving 17,794 citations.

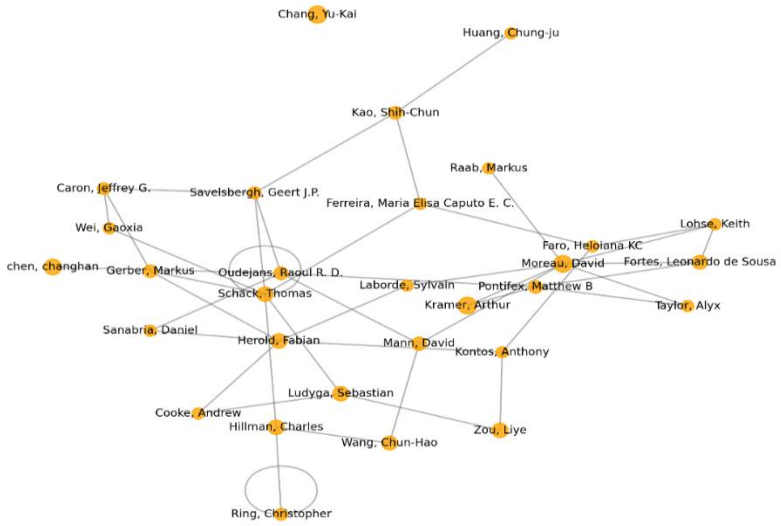

Figure 3. Representative Interaction Network Among Top 30 Authors

Figure 3 presents a representative interaction network among the top 30 authors, determined based on their productivity and collaboration in the literature. This network visualizes the collaboration relationships among prominent authors in the field of research and reveals the structure of scientific communication networks.

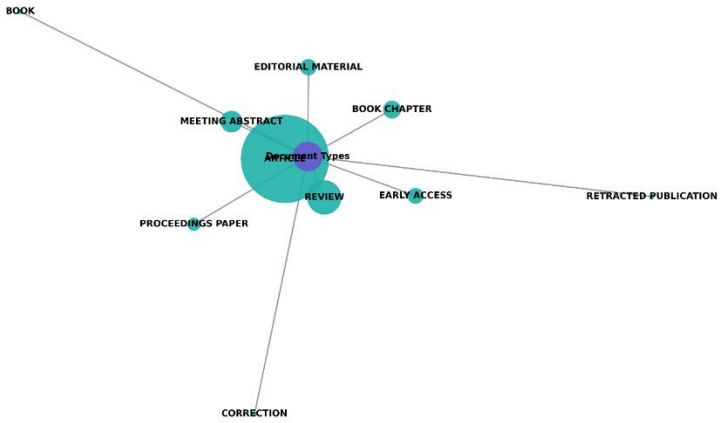

Figure 4. Network Map of Genres in Bibliometric Analysis

Figure 4 presents the bibliometric network map showing the distribution of sports psychology and brain-themed publications in the Web of Science database by type. According to the obtained data, the article type publications reached the highest number with 239, constituting approximately 67% of the total publications. This finding shows that the research area is largely based on empirical and original research.

The second most popular publication type is “review”, represented by a total of 68 publications (19%). This situation shows that the theoretical framework for the relevant theme has been reconsidered and evaluated in recent years. Publication types such as “book chapter” and “proceedings paper” are generally included in the scope of conference proceedings or editorial compilations, and their academic impact in the literature remains relatively limited.

In addition, it was determined that there were 24 publications in the “meeting abstract” genre, which shows that the subject is frequently discussed in scientific events such as congresses and symposiums. On the other hand, the “editorial material”, “letter” and “correction” genres were represented in small numbers and the direct academic contribution of these genres to the literature is evaluated as relatively low. Finally, the presence of only 1 “early access” publication indicates a current study on the subject that has not yet been published but is in the publication process.

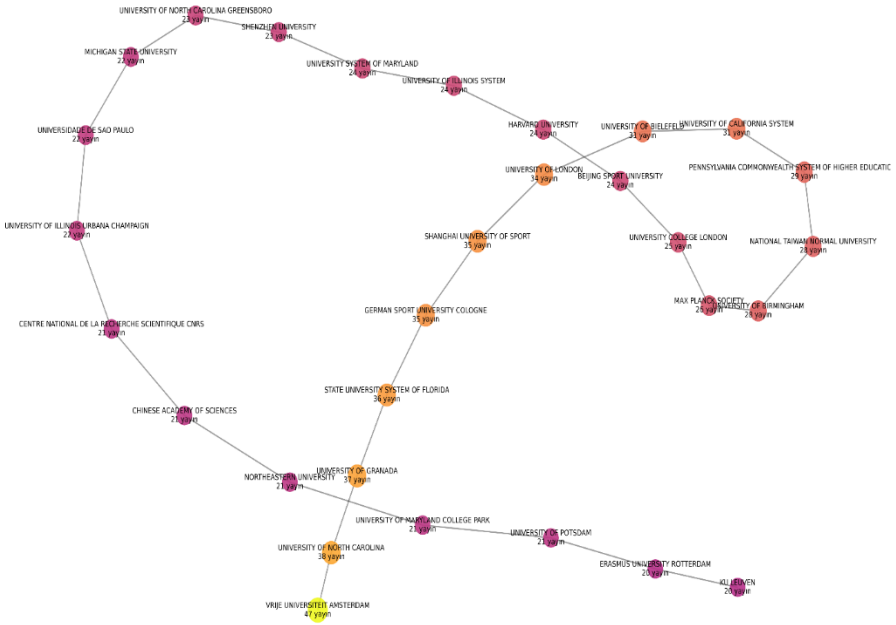

Figure 5. Inter-Institutional Interaction Network (First 30 Institutions)

Figure 5 visualizes the interaction network of the top 30 institutions with the highest number of publications on sports psychology and brain-themed scientific publications. The analysis presented in the visual is based on 1,162 academic publications obtained from the Web of Science Core Collection database. This comprehensive dataset provides a strong and reliable basis for bibliometric analysis, enabling the analysis of academic collaborations, productivity and impact areas at the institutional level. The network structure reveals the concentrated collaboration patterns among specific institutions and the central actors in publication production.

Conclusion

In this study, the development process of publications focusing on the relationship between sports psychology and the brain over the last 15 years was examined using the bibliometric analysis method. The findings show that this research area has grown rapidly, especially in the post-2020 period, and has gained an interdisciplinary structure. The literature, shaped around concepts such as neurocognitive effects of sports, mental fatigue, attention, self-regulation and emotional balance, is expanding at both theoretical and applied levels (Donnelly et al., 2023; Liu et al., 2022).

The distribution of publications and citations by year is parallel to the increasing awareness of individuals regarding mental health, motivation and brain functions, especially in the post-pandemic period. Indeed, the COVID-19 pandemic has brought the effect of exercise and sports on psychological health to the agenda; this has accelerated research in the brain-health-sports triangle (Chen et al., 2021; Li et al., 2023).

Keyword analyses have shown that terms such as “executive function”, “mental fatigue”, “brain plasticity” and “cognitive performance” are prominent. This situation coincides with current research emphasizing that sports have significant effects not only on physical but also on cognitive and emotional development (Chang et al., 2022; Gomez-Pinilla & Hillman, 2013). In particular, the effects of high-intensity training on processes such as decision-making, attention, reaction time and emotion regulation are frequently discussed today.

The relationship between sports psychology and neurocognitive functions demonstrates that athletic performance is closely linked not only to physical capacity but also to cognitive competence. This is consistent with previous research showing that cognitive components such as attention, decision-making, and executive functions are more developed in elite athletes (Vestberg et al., 2021). This suggests that athletes' mental processes play a decisive role in the execution of technical and tactical skills and their ability to make sound decisions under pressure.

In particular, neuroimaging studies conducted by Kim et al. (2022) on elite athletes reveal that long-term motor learning leads to significant structural changes in brain connectivity. This finding supports the hypothesis, derived from our study, that sport-specific mental processes can be shaped by neuroplasticity. Similarly, a systematic review by Wang et al. (2021) highlights that resting brain connectivity is stronger and more efficient in elite athletes. This suggests that not only activity during training but also the athlete's overall cognitive organization is related to performance.

Current approaches also suggest that factors such as attentional control, working memory, and emotional regulation should be considered when explaining the relationship between cognitive load and performance in sports (Fuss et al., 2022). A significant contribution of the current study in this context is that it addresses the link between cognitive processes and physical performance from multiple perspectives, moving beyond the one-way correlational approaches in the literature. The findings clearly demonstrate to sports psychology researchers that neurocognitive components should not be neglected in performance-enhancing strategies.

Author and institution analyses have shown that researchers based in the USA, Canada, England, and Germany are at the forefront in this field. Multicenter projects and funded research conducted in these countries increase the scientific visibility of the topic (Zhao et al., 2023). Interinstitutional networks also reveal that certain universities play a central role in both productivity and collaboration.

In addition, when the publication types were examined, it was seen that research articles were predominant, but compilation and meta-analysis studies were also increasing. This finding shows that the theoretical foundations of the field have matured and the process of testing new theoretical models has begun (Tanaka & Abe, 2022).

Suggestions

This study provided a general view of scientific publications centered on sports psychology and brain interaction; a mapping was performed according to years, countries, institutions, authors and themes. The findings show that the field has a high development potential and that interdisciplinary research will become even more important in the coming period.

In this context, the following suggestions can be made:

- ✓ Projects based on the integration of neuroscience and sports psychology should be increased.
- ✓ Researchers from developing countries should be supported by international collaborations.
- ✓ Experimental studies using high technology (EEG, fMRI, NIRS, etc.) should be made widespread.
- ✓ Practical-theoretical bridges should be established between practitioners (coaches, sports psychologists) and researchers.

In conclusion, the cognitive and neurological effects of sports provide a comprehensive perspective not only on athletic success but also on individual well-being and neurological health. The bibliometric analysis method is a powerful tool to strategically reveal the direction and potential of this development.

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