ISSN: 2710-0723

From Mental Training to Mental Empowerment: Hot Topics and the Evolution of the Knowledge Structure in International Sports Psychology Research

-- An Analysis of Citation Metrics Using CiteSpace and VOSviewer

Wei Gu[1], Wei Yang[2,*], Bangjin Liao[1], Jianyu Zhang[3]

[1] Yunnan Agricultural University, Kunming, China

[2] Dehong Vocational college, Dehong, China

[3] Yunnan Open University, Kunming, China

[*]Corresponding Author

Abstract

To uncover the developmental trajectory and knowledge structure of current research trends in international sports psychology, this study used the Web of Science Core Collection as its data source to retrieve sports psychology-related literature from 2014 to 2026, and comprehensively employed CiteSpace and VOSviewer to conduct bibliometric and visualization analyses. The study reveals that: (1) The number of published papers exhibits a three-stage evolution: "a low starting point (2014-2019, an annual average of approximately 9 papers)-a surge followed by fluctuations (2020-2022, peaking at 17 papers)-a plateau at a high level (2023-2026, stabilizing at 14-16 papers); (2) The keyword co-occurrence network comprises 511 nodes and 1,087 connections (density 0.022), with"performance" (49 occurrences, centrality 0.39), "sport" (36 occurrences), and "sport psychology" (29 occurrences) forming the core hubs; the domain knowledge structure exhibits a "core–periphery" pattern; (3) Keyword clustering formed 12 thematic clusters (Q = 0.6401, S = 0.8604), with #0 "mental skills"as the core skill layer, interwoven with individual psychological variable layers such as"self-talk,""self-confidence,"and"flow," as well as situational layers such as"athletic injuries"and"sport environment";(4) The emergence of terms occurred in two successive waves: from 2023 to 2024, technical terms related to "mental training"-such as"mental training"and "self-talk"-dominated; from 2024 to 2026, terms in the "intervention–health" category-including "intervention," "social support," "recovery," and"physical activity"-collectively emerged and have persisted to the present; (5) The international collaboration network is centered around three major hubs-the United States, China, and England-with close collaboration within Europe. Author collaboration exhibits a "multicenter, weakly coupled"small-team structure. Research indicates that the field is evolving from a performance-oriente"mental training" paradigm toward a health-oriented"psychological empowerment" paradigm; however, the traditional performance-oriented approach remains dominant, and empowerment-related topics are still in the early stages of development.

Keywords

Sports Psychology; Mental Training; Psychological Empowerment; CiteSpace; VOSviewer; Bibliometrics.

ISSN: 2710-0723

1. Introduction

As an interdisciplinary field at the intersection of psychology and sports science, sports psychology plays a crucial role in advancing both the theoretical framework and practical application of sports training, competitive performance, and physical and mental health. Since the beginning of the 21st century, international research in sports psychology has continued to expand; the fields of sports and exercise psychology have established a relatively stable system of journals and an international academic community, gradually evolving into a mature interdisciplinary field.

Traditional sports psychology, with Psychological Skills Training (PST) as its core paradigm, has focused on technical approaches such as anxiety regulation, imagery training, and self-talk. Its primary objectives have been to correct athletes' negative psychological states and enhance competitive performance, giving rise to a long-standing cluster of research themes centered on psychological skills interventions. However, over the past decade or so, the research orientation in this field has undergone profound changes: the widespread influence of positive psychology and self-determination theory has shifted the research perspective from "correcting psychological deficits"to "cultivating intrinsic psychological resources," with concepts such as psychological resilience, motivation, and basic psychological needs receiving increasing attention; the convergence of neuroscience and sports psychology has given rise to new concepts, such as the integration of psychological interventions with neural monitoring and digital technologies. By combining psychological intervention techniques with wearable neural monitoring devices, the scope of intervention has expanded from symptom elimination to the systematic development of cognitive and emotional regulation abilities.. At the same time, the impact of the COVID-19 pandemic on athletes'mental health, the professionalization of esports, and the application of artificial intelligence and virtual reality technologies have further accelerated the diversification and restructuring of research topics in the field.

Academics have summarized these changes as a paradigm shift from"mental training"to "mental empowerment": the former is grounded in the training of mental skills and the correction of psychological deficits, while the latter is centered on the activation and maintenance of psychological resources and the promotion of individual well-being. A review of existing bibliometric findings reveals that most current research is limited to single, narrow topics such as mental fatigue or mindfulness, or is conducted from a single-country perspective. Few studies adopt a comprehensive international perspective to systematically examine the paradigm shift from "mental training" to "psychological empowerment"using multiple knowledge graph tools. Whether this paradigm shift toward "psychological empowerment" has already taken root or remains in a transitional phase still lacks structural evidence from a bibliometric perspective.

Based on this, this study selected international sports psychology literature indexed in the Web of Science Core Collection from 2014 to 2026 as its sample. By comprehensively utilizing CiteSpace and VOSviewer to conduct bibliometric visualization analysis, the study seeks to answer the following questions: (1) What are the evolutionary characteristics of publication volume in the field of international sports psychology? (2) What are the structural characteristics of research collaboration networks at the national and author levels? (3) What knowledge structures and paths of frontier evolution are reflected in the results of keyword co-occurrence, clustering, and emergence? (4) At what stage of development is the paradigm shift "from mental training to mental empowerment"based on bibliometric evidence? The study aims to clarify the development trends in international sports psychology and provide references for the disciplinary development and research topic selection in domestic sports psychology[1-3].

ISSN: 2710-0723

2. Research Methods

2.1. Data Sources

This study utilized the Web of Science Core Collection (SSCI and SCI-EXPANDED) as its data source. The search query consisted of the terms “sport psychology,” “exercise psychology,” “sport and exercise psychology,” as well as keywords related to mental skills training and psychological empowerment. The search was limited to English-language articles classified as “Article” or “Review,” with a time span from January 1, 2014, to August 31, 2026. The search yielded a total of 168 articles. After importing the articles into reference management software and removing duplicates from the bibliographic records, two researchers independently screened the articles for thematic relevance based on titles, keywords, and abstracts. Nine articles unrelated to the topic of sport psychology were excluded, resulting in a final sample of 159 articles for analysis.

2.2. Research Tools

CiteSpace (v.6.4.R1) was used for keyword co-occurrence, clustering, timeline, and emerging term analysis: the time slice was set to 1 year, the node type was “Keyword,” and the selection criteria were g-index (k=25), LRF=2.5, L/N=10, LBY=5, and e=1.0, with unpruned networks.

VOSviewer was used to generate keyword density visualizations and to map collaboration networks among authors and countries. Data were exported in plain text format and imported into both software programs for processing.

3. Research Findings and Analysis

3.1. Number of Publications

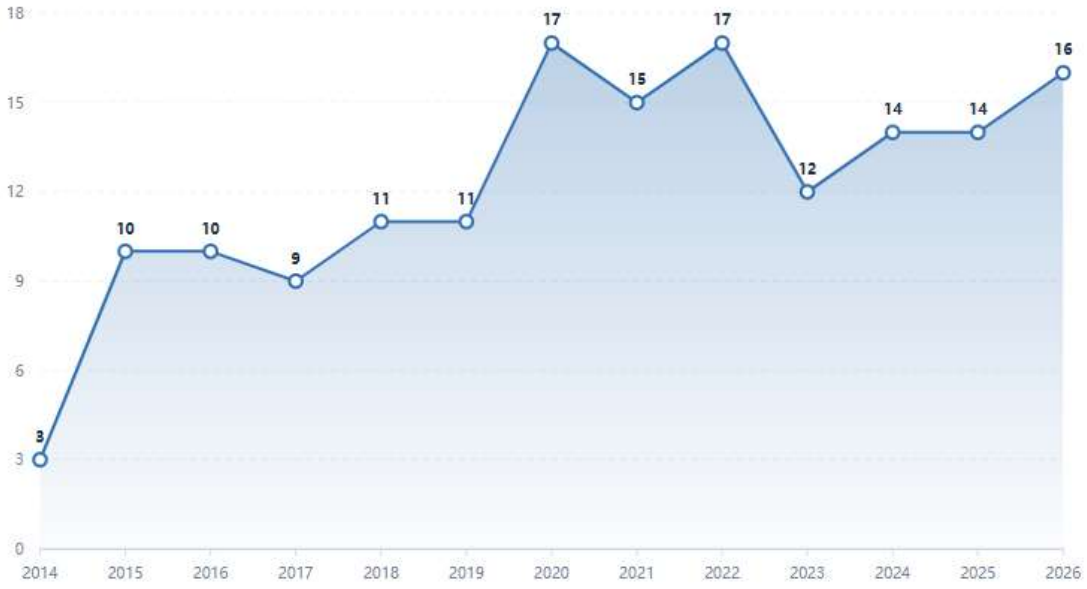


Figure 1. Trend Chart of Publication Volume

According to statistical data, the number of publications in this field has followed a clear phased pattern: 1. Initial Low-Growth Phase (2014–2019): Only 3 papers were published in 2014, and from 2015 to 2019, the number fluctuated within a narrow range of 9 to 11 papers, with an average annual output of approximately 9 papers and slow growth. 2. Surge and Volatility Phase (2020–2022): In 2020, the number surged to 17;[4-6] it dipped to 15 in 2021, then reached 17 again in 2022, marking a significant peak. 3. High-Level Plateau Phase (2023–2026): The number fell to 12 in 2023 but stabilized in the range of 14 to 16 from 2024 to 2026. This

ISSN: 2710-0723

indicates that, despite a short-term adjustment in 2023, the baseline for publications in this field is now significantly higher than pre-2019 levels, marking the entry into a new phase of stable output.

Table 1. Annual Distribution and Year-over-Year Changes in Publication Volume, 2014–2026

Year	Number of Articles	Year-over-Year Change
2014	3	—
2015	10	7
2016	10	0
2017	9	-1
2018	11	2
2019	11	0
2020	17	6
2021	15	-2
2022	17	2
2023	12	-5
2024	14	2
2025	14	0
2026	16	2

Prior to 2019, traditional sports psychology primarily focused on “Psychological Skills Training” (PST), aiming to address athletes’ negative psychological states such as anxiety and stress. The scope of research was relatively narrow, and publication volumes remained relatively stable. However, beginning in 2020, the research focus shifted toward“Psychological Empowerment.”Cutting-edge international research indicates that contemporary sports psychology is no longer limited to“problem correction”but has shifted toward enhancing athletes’ psychological resources, cognitive regulation abilities, and sense of self-determination (such as basic psychological needs and motivational activation). This paradigm shift broadened the scope of research, leading to a surge in related literature between 2020 and 2022 (peaking at 17 articles).

The publication surge from 2020 to 2022 was driven by both external environmental factors and internal technological advancements. On the one hand, the COVID-19 pandemic had a massive impact on the training and mental health of athletes worldwide, prompting the academic community to focus on topics such as psychological resilience and coping strategies, which led to a surge in publications. On the other hand, the convergence of digital technology and sports psychology (such as esports psychology, virtual reality interventions, and AI-assisted cognitive training) rapidly emerged during this period, providing new empirical settings for “psychological empowerment.”

The number of publications dropped to 12 in 2023, likely due to the waning of emergency-related research following the pandemic; however, the fact that the figure quickly stabilized at 14-16 between 2024 and 2026 indicates that technological convergence (such as AI and wearable devices) and emerging fields (such as esports psychology) have become new pillars supporting the field’s development.

ISSN: 2710-0723

3.2. Co-occurrence Network of Core Authors

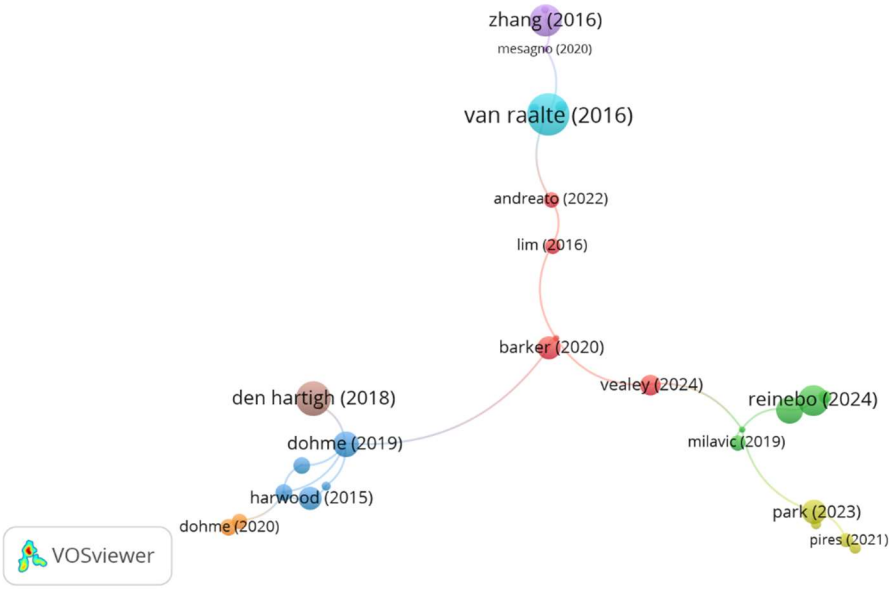


Figure 2. Collaboration Network of Core Authors

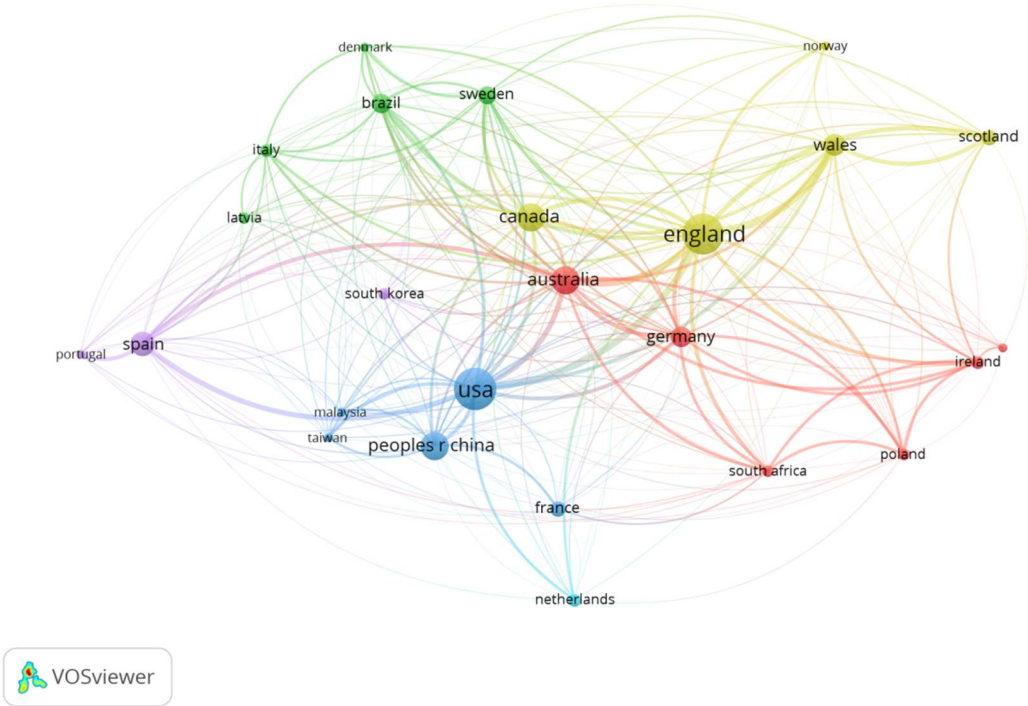


Figure 3. National Cooperation Network Diagram

3.2.1. Collaboration among Core Authors: A Loose Collaborative Structure Featuring Multiple Coexisting Groups Linked by Hub Nodes

The collaboration network of core authors (Figure2), generated using VOSviewer, depicts a total of 15 author nodes. The network forms four interconnected collaborative groups; there are no isolated nodes, and all authors are integrated into the collaborative system through direct or indirect connections[7].

ISSN: 2710-0723

In terms of cluster composition: The first cluster centers on van Raalte (2016) and connects authors such as Zhang (2016), Mesagno (2020), and Lim (2016); furthermore, it extends via the Barker (2020)–Dohme (2019) link to Den Hartigh (2018) and Harwood (2015), and Dohme (2020). This is the collaboration group with the widest coverage and greatest scope within the network; the second group consists of the direct collaboration between Barker (2020) and Vealey (2024); the third group is formed by Vealey (2024)-Milavic (2019)-Reinebo (2024); the fourth group consists of Milavic (2019)-Park (2023)-Pires (2021). The four groups are not isolated from one another but are indirectly connected through bridging nodes such as Barker, Dohme, Vealey, and Milavic, thereby maintaining the connectivity of the overall network.

This structure indicates that author collaboration in the field of international sport psychology research exhibits two characteristics: First, collaboration is primarily conducted within small teams, and no large-scale collaborative clusters covering the entire field have yet formed; most groups consist of only 2-4 authors. Second, academic connections between groups rely on cross-group collaboration by a small number of hub authors; for example, Barker serves as a connection point between the first and second groups, Vealey connects the second and third groups, and Milavic bridges the third and fourth groups. This“multicentric, weakly coupled” collaboration pattern aligns with findings from existing research-leading teams in international exercise psychology research are concentrated in universities in countries such as the United Kingdom and the United States, while research efforts are distributed in a decentralized manner.

It should be noted that the figure does not specify the number of publications or centrality metrics for each author; relative assessments can only be made based on node size. Van Raalte (2016) is the largest node in the network and can be regarded as a core author in the collaboration network.

3.2.2. National Cooperation Landscape: A Multilevel Network Characterized by U.S.-U.K. Leadership, European Cohesion, and Broad Intercontinental Linkages

The national/regional cooperation network (Figure3), also generated using VOSviewer, covers more than 20 countries and regions, including the United States, China, England, Australia, Germany, and Canada. All nodes are involved in cooperation, with no isolated countries, forming a connected network.

(1) The United States and China constitute the core hubs of the network.

In terms of node size, the United States, China, and England are the three largest nodes in the network, indicating that these three countries have published the most papers in this field. The United States has the widest reach in terms of collaboration, with high-intensity thick links to the vast majority of nodes, including China, Australia, Germany, Canada, France, and the Netherlands, making it the country with the highest coverage of international collaboration; China also maintains close collaboration with Australia, the United States, England, Germany, and others, serving as another core hub within the network. This pattern aligns with the overall distribution of international research in sports psychology-bibliometric analysis of the application of positive psychology to sports research shows that the United States and the United Kingdom exert the strongest academic influence in this field.

(2) Cooperation within the European region is highly intensive.

Dense connections exist among European countries such as England, Germany, France, the Netherlands, Spain, Italy, and Sweden, and the connections between England, Wales, and Scotland are particularly strong, demonstrating a prominent intensity of intra-regional cooperation. The close connections among the three regions of the United Kingdom (England, Wales, and Scotland) actually reflect the active collaboration within the UK’s domestic academic community.

(3) The collaboration network exhibits a distinct clustering structure.

ISSN: 2710-0723

The color coding in the figure reveals five types of collaboration clusters: (1) Spain and Portugal form a tight Iberian sub-cluster; (2)Denmark, Brazil, Sweden, Italy, and Latvia form a predominantly European cluster (with Brazil as the sole non-European member); (3)a Commonwealth/North Atlantic cluster comprising Norway, Wales, Scotland, England, and Canada;(4)a transcontinental cluster comprising Australia, Germany, South Africa, Ireland, and Poland; (5)a broad-scale cluster spanning North America, East Asia, and Europe, comprising the United States, China, Malaysia, Taiwan, France, the Netherlands, and South Korea. The cluster composition reveals that both geographical proximity and affinity based on academic traditions (such as language and Commonwealth ties) jointly shape the cooperative groupings among countries.

(4) The network exhibits strong overall connectivity, but there is a distinct hierarchy in the intensity of cooperation.

In addition to the aforementioned high-intensity core links, the network contains a large number of thin, light-colored connections, indicating sporadic, small-scale cooperation among most countries.[8] This suggests that international collaboration in this field has achieved a broad“surface area”of engagement, but in-depth collaboration remains concentrated among a few hubs centered on the U.S., China, and the U.K.,while secondary countries primarily participate in international collaboration by linking to these core hubs.”

Overall, this research field has formed a two-tiered collaboration structure characterized by “weak coupling among multiple groups at the author level and strong radiation from multiple hubs at the national level”: author collaboration is dominated by small teams and relies on key figures to connect them; national collaboration, meanwhile, centers on the United States, China, and England as the three major hubs, with close collaboration within the European region and widespread but unevenly intense intercontinental cooperation. On the one hand, this pattern reflects the high degree of openness and internationalization in international sports psychology research; on the other hand, it also points to a tendency toward centralization in the collaboration network-research resources and collaboration opportunities are concentrated in a few core countries and hub authors, while the in-depth participation of the vast majority of small and medium-sized countries and young scholars remains insufficient.

3.3. Keyword Co-occurrence Analysis

Table 2. Statistics on Keyword Frequency and Centrality

No.	Count	Centrality	Year	Keywords
1	49	0.39	2014	performance
2	36	0.38	2017	sport
3	29	0.22	2015	sport psychology
4	14	0.12	2016	psychological skills
5	13	0.05	2014	skills
6	12	0.13	2014	perceptions
7	11	0.19	2014	exercise
8	10	0.12	2016	anxiety
9	10	0.16	2016	imagery
10	9	0.06	2018	validation

ISSN: 2710-0723

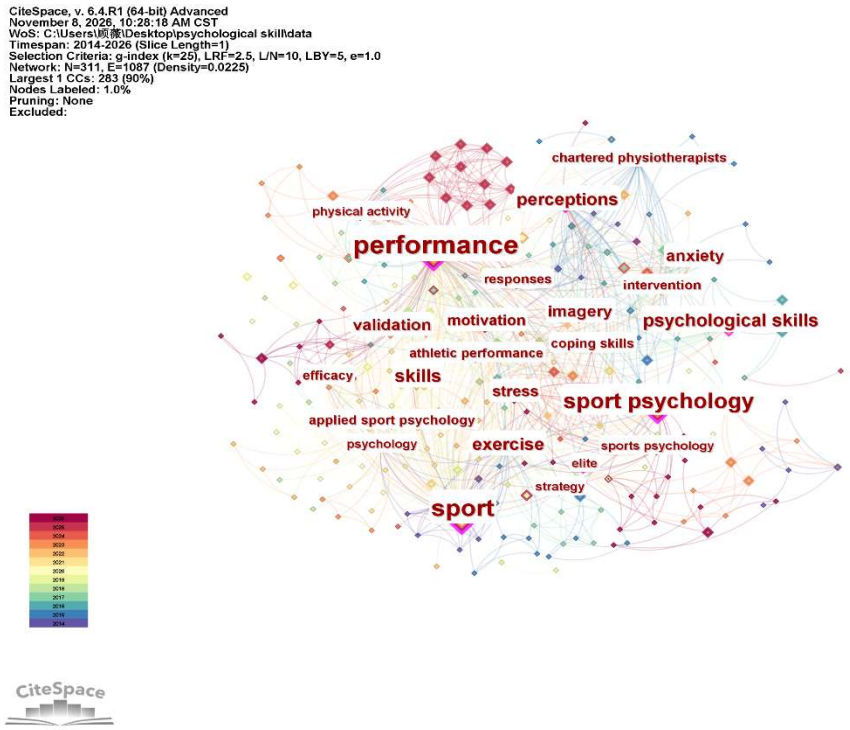


Figure 4. CiteSpace Keyword Co-occurrence Network

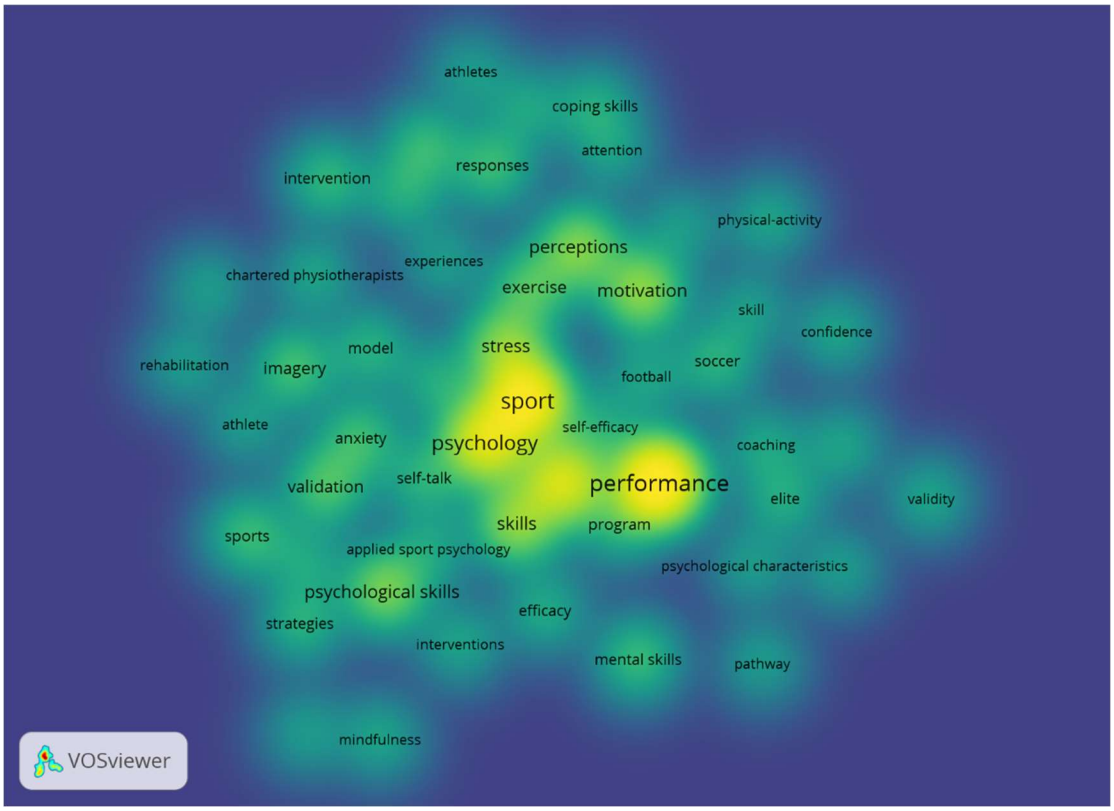


Figure 5. VOSviewer Keyword Density View

3.3.1. Overall Network Characteristics: Numerous Nodes, Moderate Density, and a Distinct Core-Periphery Structure

The CiteSpace co-occurrence network (Figure 4) covers the time span from 2014 to 2026 (one-year time slice), with a network size of 511 nodes and 1,087 links, a density of 0.022, a node labeling rate of 1%, and no pruning. A minimum co-occurrence threshold was applied during

ISSN: 2710-0723

the clustering process, resulting in a corresponding reduction in the number of nodes. This parameter indicates: (1) a large number of keywords and highly dispersed domain topics; (2) a density of 0.022, which is relatively sparse, suggesting that co-occurrence relationships among keywords have not yet reached saturation[9], indicating significant room for further interdisciplinary convergence of research themes; (3)The network exhibits a "nebula-like"structure, dense at the center and diverging toward the periphery-a typical "core-periphery"pattern-where a small number of core keywords are highly interconnected, while a large number of low-frequency terms are scattered along the periphery.

3.3.2. Characteristics of High-Frequency Terms: A Performance-Oriented Structure with "performance" as the Absolute Core

The Frequency–Centrality Table (Table 2) shows that the top 10 keywords, in order, are: performance (49 occurrences), sport (36 occurrences), sport psychology (29 occurrences), psychological skills (14 occurrences), skills (13 occurrences), perceptions (12 occurrences), exercise (11 occurrences), anxiety (10 occurrences), imagery (10 occurrences), and validation (9 occurrences). This reveals three key characteristics:

First, "performance" is the central node of the entire network: it ranks first in both frequency (49) and centrality (0.39), and in the VOSviewer density map (Figure 5), it is located in the brightest yellow core area. These three figures collectively validate its central status. This indicates that international sports psychology research prioritizes the enhancement of athletic performance, and that "performance" simultaneously serves as a bridging hub connecting various thematic clusters.

Second, there is a clear divergence between frequency and centrality. Only six terms have a centrality exceeding 0.1: "performance" (0.39), "sport" (0.38), "sport psychology"(0.22), "exercise" (0.19), "imagery"(0.16), and "perceptions" (0.13). In contrast, "skills," which ranks fifth in frequency, has a centrality of only 0.05, while "validation" has a centrality of just 0.06; these belong to "cohesive" themes-their co-occurrence is limited to specific clusters. "Imagery,"with a moderate frequency but a centrality of 0.16, belongs to a "bridging" theme. This indicates that the framework of domain knowledge is supported by a small number of "high-frequency, high-centrality"hub terms, while most high-frequency terms are active only within their internal clusters.

Third, discipline-specific terms and classic psychological variables are equally prominent. Discipline-specific terms such as"sport,""sport psychology,"and "exercise"share the high-frequency list with classic psychological constructs like "anxiety," "imagery," and "perceptions," while the inclusion of "validation" suggests that scale development and instrument validation are routine practices in this field.

3.3.3. Characteristics of the VOSviewer Density Map: Heat Distribution Shows a Gradient of "Hot at the Center, Cooler at the Edges"

The VOSviewer density view (Figure 5) visually represents the gradient of keyword heat through color gradients, providing triple corroboration with Figures 1 and 2: The hot core area-where "sport,""psychology,"and"performance"are located in the brightest yellow region-represents the absolute hotspots of the field; Secondary-heat transition zone: "stress," "exercise,""motivation," "perceptions," "self-efficacy,"and others appear in yellow-green, representing important related themes of moderate heat; Cool peripheral zone:"mindfulness," "pathway,""validity,""rehabilitation,""soccer,""football,"and others are located in the blue-green periphery, indicating low co-occurrence frequency and weak associations.

The unique value of the density map lies in revealing both the concentration of hotspots and the divergence of directions: two points are particularly noteworthy. First, "mindfulness"is located in the cold zone at the very edge of the density map-mindfulness and acceptance-based approaches have been recognized as emerging research directions in international sport

ISSN: 2710-0723

psychology (bibliometric analysis of mindfulness and sport research from 1969 to 2021 shows sustained growth in this area), but in the data from this study, it remains on the low-density periphery, indicating that its application in this field is still insufficient and represents a force that is currently gaining momentum. Second, positive psychological variables such as "self-efficacy" and "confidence" are located in the secondary hot zone rather than the core zone. This indicates that psychological resource-related topics under the "empowerment"orientation have accumulated to a certain extent but have not yet shaken the performance-oriented paradigm dominated by"performance."

3.4. Keyword Clustering

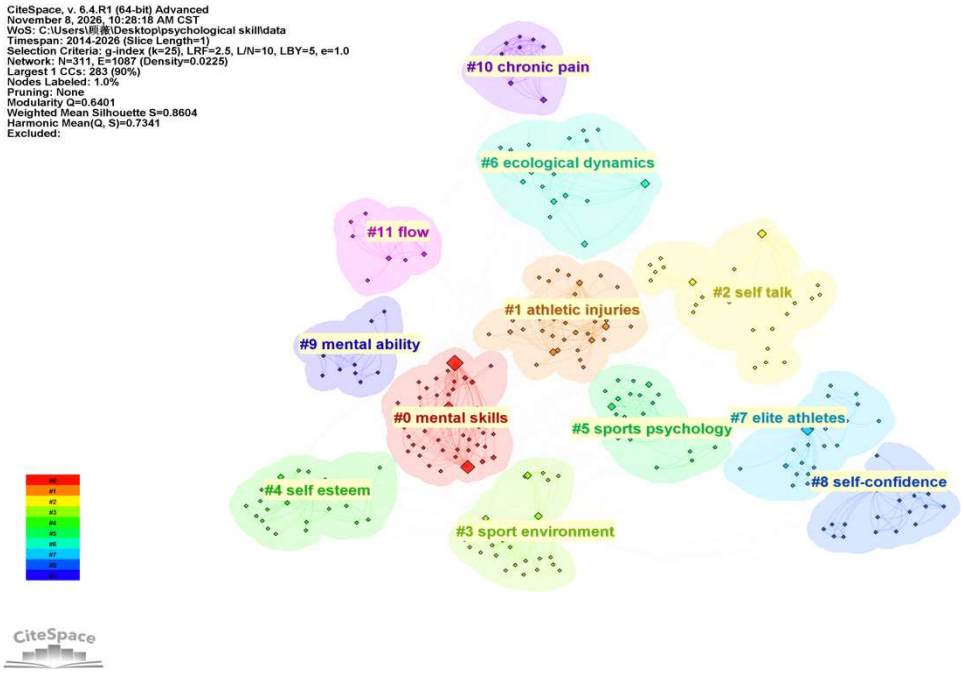


Figure 6. Keyword Clustering Network

3.4.1. Overall Clustering Quality: Distinctive Structure, Reliable Clusters

This clustering network formed a total of 12 clusters (numbered #0–#11), with a network size of 331 nodes and 287 edges, a density of 0.005, and a maximum connected subgraph containing 283 nodes (accounting for 86%). The two key indicators of clustering quality are: modularity Q = 0.6401 and weighted average silhouette S = 0.8604.

The Q value of 0.64 and the S value of 0.86 for this network indicate a high degree of thematic differentiation in this field, good homogeneity within each cluster, and reliable clustering results, which can serve as a basis for knowledge structure classification. The harmonic mean of Q and S (Q, S) = 0.7341 is also at a good level.

3.4.2. Cluster Composition: Centered on Mental Skills, Forming Three Levels of "Skills-Individual-Situation"

Based on the thematic content of the 12 clusters, the knowledge structure in this field can be summarized into three interrelated levels:

First Level: Core Skills Layer-#0 mental skills. This cluster, colored red and the largest in size, serves as the central cluster of the entire network. It aligns with the distribution of keywords centered on"performance"and"psychological skills"in the map, indicating that Psychological Skills Training (PST) constitutes the core knowledge domain of international sports psychology research. Second Level: Individual Psychological Variables Layer. This includes #2 self-talk, #4 self-esteem, #8 self-confidence, #9 mental ability, and #11 flow. These clusters all point to psychological constructs and states at the individual athlete level; among them, self-talk, self-

ISSN: 2710-0723

confidence, and flow represent specific technical methods and target states of Psychological Skills Training (PST)-self-talk itself is a classic intervention technique in PST, while flow is a cutting-edge topic in positive psychology confirmed by international research. It is worth noting that the existence of clusters such as #11 flow and #4 self-esteem provides preliminary evidence at the cluster level for the overarching theme of "from mental training to psychological empowerment": these positive psychology-oriented themes have formed relatively independent clusters rather than merely scattered keywords.

Third Level: Context and Background. This includes #1 athletic injuries, #3 sport environment, #6 ecological dynamics, #7 elite athletes, #10 chronic pain, and #5 sports psychology. This set of clusters indicates that the research context of mental skills is primarily anchored in elite athletes and competitive sports settings, extending to applied topics such as sports injury management, chronic pain management, and ecological constraints. Notably, the independent clustering of #6 ecological dynamics warrants attention-it represents a theoretical orientation that shifts "from individual cognition to human-environment interactions," suggesting that theoretical perspectives in this field are emerging that transcend traditional information-processing paradigms; meanwhile, #10 chronic pain indicates the expansion of sports psychology into clinical rehabilitation and pain management.

3.4.3. Two Prominent Characteristics of the Cluster Structure

First, "performance-oriented" and "positive-oriented" themes coexist, with clearly defined hierarchical levels. The clusters include not only traditional topics related to competitive performance (mental skills, self-talk, self-confidence, elite athletes), but also topics focused on positive psychological qualities (self-esteem, flow), as well as health-related topics such as injuries and pain (athletic injuries, chronic pain) . This coexistence of diverse elements indicates that international sport psychology has expanded from a single"performance enhancement"paradigm to a multiparadigm framework in whic "performance," "health," and"positive development"coexist. However, given that Cluster #0 is the largest, the traditional mental skills paradigm remains dominant, while the clusters for positive-oriented topics are relatively small.This finding is consistent with the previous analysis of high-frequency terms (where the core terms were all traditional themes that emerged between 2014 and 2018):"empowerment"related topics have formed a distinct structure but have not yet become the dominant force.

Second, the clusters are relatively fine-grained, reflecting the specialized division of labor within the field's themes. Several themes among the 12 clusters (such as "self-talk," "flow,"and"self-confidence") could have been grouped under the broader"mental skills"category; however, they form independent clusters with an S-value of 0.86. This indicates that the literature within each of these sub-themes exhibits close co-occurrence and clear boundaries, reflecting the mature characteristics of highly specialized and segmented research in this field.

ISSN: 2710-0723

3.5. Keyword Emergence and Evolution

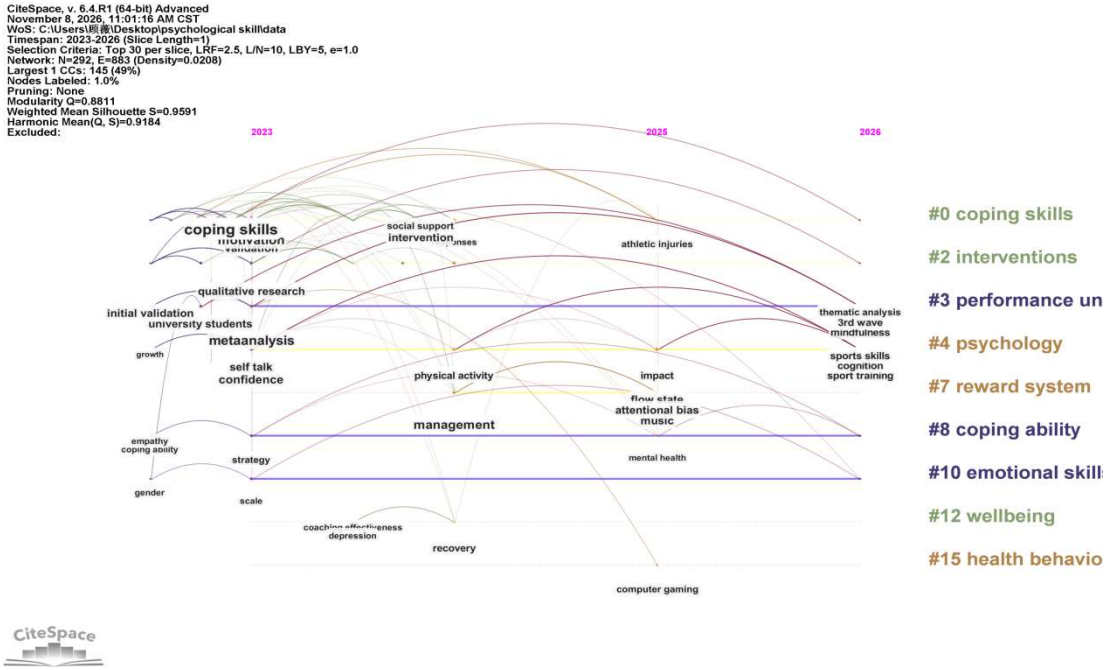


Figure 7. Keyword Timeline Map

Table 3. Top 11 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	2023 - 2026
psychology	2023	0.69	2023	2024	
mental training	2023	0.46	2023	2024	
model	2023	0.46	2023	2024	
self talk	2023	0.46	2023	2024	
social support	2024	0.51	2024	2026	
management	2024	0.51	2024	2026	
intervention	2024	0.51	2024	2026	
mental skills	2024	0.51	2024	2026	
recovery	2024	0.34	2024	2026	
motivation	2023	0.33	2024	2026	
physical activity	2024	0.33	2024	2026	

3.5.1. Overall Characteristics of Emerging Terms: A Two-Phase Sequence, with the Focus Shifting from "Mental Training Techniques" to "Intervention-Health-Behavior"

The list of emerging terms (Top 11, 2023–2026) shows that the research frontier exhibits a clear two-phase sequence:

First Phase (2023–2024): The emerging theme was"mental training" itself. The keywords emerging during this period were"psychology"(intensity 0.69), "mental training" (0.46), "model" (0.46), and "self-talk" (0.46). This set of terms directly addresses the core techniques of mental training-self-talk is a classic intervention technique in Psychological Skills Training (PST), while "mental training" is a direct representation of the "training"orientation. This indicates that

ISSN: 2710-0723

around 2023, the academic focus remained on the model construction and training methods of the techniques themselves.

Second Wave (2024–2026, with most studies continuing through the search cutoff year): The emerging theme shifted to“intervention applications and health associations.”The keywords that emerged during this period were social support (0.51), management (0.51), intervention (0.51), mental skills (0.51), recovery (0.34), motivation (0.33, emerging in 2024), and physical activity (0.33).

A comparison of the two phases reveals three key insights:

First, while the overall emergence intensity was not high, its persistence has increased. The highest intensity in the first wave was 0.69, and all terms ceased to emerge by 2024; in the second wave, although the intensity of individual terms mostly ranged between 0.33 and 0.51, all seven terms continued to emerge through 2026-meaning they remain active to this day. The “long tail”of emerging terms persists and better represents current and future research frontiers than short-term, high-intensity spikes.

Second, the composition of emerging terms has shifted from“noun-based techniques”to“verb-based applications.”In the first wave,“mental training,” “self-talk,” and“model” all belonged to the realm of techniques or concepts; in the second wave, “intervention,”“management,”“social support,”“recovery,”and “physical activity”point toward application scenarios and operational processes-such as intervention implementation, support systems, fatigue recovery, and the promotion of physical activity. This aligns with the overall trend in international research: the research frontiers in the psychology of sports and exercise have expanded to include applied topics such as the promotion of mental health and well-being.

Third, the emergence of “recovery”and“physical activity”provides preliminary evidence at the emergence level for the main evolutionary thread“from mental training to psychological empowerment”-research concerns are shifting from“how to train mental skills to enhance performance”to“how psychological approaches support recovery, health, and participation in physical activity.” However, it should be emphasized that terms such as “empowerment,” “well-being,” and “resilience” do not appear in the list of emerging terms (although “well-being” is clustered in the timeline diagram); therefore, the evidence for the shift toward “empowerment”can currently only be described as“indirect indications,”and excessive inferences should be avoided.

3.5.2. Timeline Characteristics: Life Trajectories of 9 Clusters and the “New-Old Transition”

The timeline chart (2022–2026, Top 30 per slice, N=709, E=425, density 0.0028) exhibit exceptionally high clustering quality: Q = 0.8811, S = 0.9591, and a harmonic mean of 0.9184. These metrics all outperform those of the previous full-period (2014–2026) clustering (Q = 0.6401, S = 0.8604), indicating that thematic differentiation has become clearer and clustering more reliable since 2022. The life cycles of the nine visible clusters fall into three categories:

Category 1: Mature and Continuous-clusters spanning the entire period. #15 “health behavior”and #3“performance enhancement” (including terms such as “athletic injuries,”“flow state,”and“mental health”) spanned the entire 2022–2026 period, representing core topics that have remained consistently active in recent years. Notably, “mental health” and “flow state” within cluster #3 appeared in the 2024–2026 segment, echoing the health-oriented themes of the second wave of emerging terms.

Category 2: Mid-Term Active - Concentrated in 2022–2024/2025. Nodes in clusters such as #0 “Coping Skills” (including “resilience,” “qualitative research,” and “meta-analysis”), #2 “Interventions” (including “social support,” “depression,” and “recovery”), and #10“Emotional Skills” are predominantly distributed across the 2022–2024 period. This cluster includes terms such as“resilience,” “depression,” and “meta-analysis,”indicating that research during this

ISSN: 2710-0723

phase combines positive psychological variables with methodological standardization(meta-analysis, qualitative research, and scale development).

Third Category: Emerging and Growing-clusters that appeared only after 2024. The nodes of #7 “reward system” are concentrated between 2024 and 2026, making it the latest cluster to form on the timeline; #12 “well-being” (including self-worth, recovery, and computer gaming) is distributed between 2023 and 2025. Cluster #12 “well-being” emerged as an independent cluster, and its network-wide weighted average S-value reached 0.9591, indicating that the overall thematic division-including this cluster-is reliable.

3.5.3. Cross-Validation between Emergence and the Timeline: A Complete Picture of the Evolutionary Path

By comparing the list of emerging terms with the timeline chart, we can outline the evolutionary path of this field from 2022 to 2026:

Phase One (2022–2023): The period of in-depth technical exploration of “mental training.” High-frequency core terms (such as “performance” and “psychological skills,” all first appearing between 2014 and 2018) continued to dominate, while emerging terms focused on the core training techniques themselves, such as “mental training” and “self-talk.” On the timeline, skill-related clusters such as “coping skills” and “emotional skills” were active.

Phase Two (2024–2026): The “Intervention–Health” application expansion phase. Terms such as “intervention,” “social support,” “management,” “recovery,” and “physical activity” collectively emerged and have persisted to the present; new clusters such as “well-being” and “reward system” appeared on the timeline, while the “performance enhancement” cluster incorporated new nodes such as “mental health.” The focus of research frontiers is shifting from “training psychological skills” to “psychological interventions supporting health and functional status.”

This trajectory aligns with the main theme of the title, “From Psychological Training to Psychological Empowerment”: the evolution reflects a shift from focusing on training techniques themselves to focusing on the health-promoting functions of psychological resources. However, the network evidence also indicates that this shift is still ongoing—the “performance” cluster and its derivatives remain at the core of the knowledge structure (the brightest area in the density map),while empowerment-related topics (well-being, recovery, physical activity) occupy secondary and emerging positions.

4. Conclusion

Based on literature from the Web of Science Core Collection spanning 2014–2026, this study conducted a knowledge map analysis of international sports psychology research using CiteSpace and VOSviewer, reaching the following conclusions:

First, the number of publications has evolved in three phases. Overall, the field has entered a relatively stable phase of output, though annual fluctuations remain significant. The period from 2014 to 2019 was a low-volume start-up phase, with an average of approximately 9 publications per year; the period from 2020 to 2022 was a phase of rapid growth and volatility, peaking at 17 publications; and the period from 2023 to 2026 was a high-volume plateau phase, stabilizing at 14–16 publications. The baseline number of publications is now significantly higher than pre-2019 levels, but annual fluctuations remain substantial (e.g., a drop to 12 in 2023), and the 2026 figure represents an incomplete tally prior to the search cutoff date.

Second, the knowledge structure centers on a “performance-oriented” approach and exhibits a “core–periphery”pattern. “Performance” (49 occurrences, centrality 0.39), “sport” (36 occurrences), and “sport psychology” (29 occurrences) form a “double-high” pivotal link; 12 clusters (Q=0.6401, S=0.8604) form a three-tiered structure of “core skills-individual

ISSN: 2710-0723

psychological variables-situational context," with mental skills training remaining the primary knowledge domain, while sport psychology has expanded into a multi-paradigm framework featuring parallel tracks of "performance-health-positive development."

Third, research frontiers exhibit a two-phase progression, currently evolving from "mental training" toward "psychological empowerment." From 2023 to 2024, emerging terms centered on training techniques such as "mental training" and "self-talk"; from 2024 to 2026, terms related to "intervention-health"-including "intervention," "social support," "recovery," and "physical activity"-collectively emerged and have persisted to the present; on the timeline, new clusters such as "well-being" and "reward system" have formed in recent years. This evolutionary trajectory indicates that research focus is shifting from "training psychological skills to enhance performance" to "psychological interventions supporting health and functional status." However, it should be noted that this shift is still ongoing: the term "empowerment" has not yet entered either the high-frequency or emerging term lists, and empowerment-oriented topics (such as "well-being" and "recovery") remain in secondary or emerging positions; therefore, the conclusion should be framed as "showing an evolutionary trend" rather than an established fact.

Fourth, the collaboration landscape exhibits a two-tiered structure characterized by "multiple national hubs and weak coupling among authors." At the national level, the United States, China, and England serve as the three major hubs; collaboration within Europe is close-knit, but in-depth cooperation is concentrated in a few core countries. At the author level, small-scale teams predominate, relying on hub authors such as Barker, Vealey, and Milavic to connect across groups, resulting in an overall "multicentric, weakly coupled" pattern.

Acknowledgments

Funding:

(1) 2024 Yunnan Provincial Postgraduate Quality Course Construction Project - Theory and Methods of Sports Psychology;

(2) 2023 Yunnan Provincial Professional Degree Postgraduate Teaching Case Database Construction Project - Theory and Methods of Sports Psychology;

(3) 2024 Curriculum Ideology and Politics Demonstration Course Construction Project of Yunnan Agricultural University (No. YNAUKCSZSFKC2024011);

(4) 2025 Higher Education Scientific Research Planning Project of China Association of Higher Education (No. 25TY0208);

(5) 2024 Undergraduate Teaching Reform Project of Yunnan Agricultural University (No. YNAUJG2024009);

(6) 2025 Undergraduate First-Class Course Construction Project of Yunnan Agricultural University (No. 2025YLKC084);

(7) 2026 Undergraduate First-Class Course Construction Project of Yunnan Agricultural University (No. 2026YLKC033).

References

[1] Park, S., & Jeon, H. (2023). Psychological skills training for athletes in sports: A Web of Science bibliometric analysis. Behavioral Sciences (MDPI).

[2] Hambali, B. (2025). Bibliometric analysis of sport and exercise psychology research indexed in Scopus (2005–May 2025) [Online].

[3] [Anonymous]. (2020). Bibliometric analysis of the application of positive psychology in sports research. Huayi Academic Literature Database. (in Chinese)

ISSN: 2710-0723

[4] [Anonymous]. (2023). A bibliometric analysis of mindfulness and acceptance research in sports from 1969 to 2021. (in Chinese)

[5] [Anonymous]. (n.d.). Bibliometric analysis of the effects of mental fatigue on athletic performance from 2001 to 2021. (in Chinese)

[6] Cheng, M., & Zhang, L. (2022). An overview of the current status and hot topics in sports psychology research at home and abroad: A bibliometric analysis based on knowledge graphs. In Proceedings of the 24th National Conference on Psychology. (in Chinese)

[7] [Anonymous]. (2012). Scientific knowledge graph analysis of overseas research on exercise psychology. Sports Science and Technology. (in Chinese)

[8] Chen, C. (2006). CiteSpace II: Detecting and visualizing emerging trends and transient patterns in scientific literature. Journal of the American Society for Information Science and Technology, 57(3), 359–377.

[9] van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. Scientometrics, 84(2), 523–538.