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Evolution of Traditional Sports: A Bibliometric Review on Technology, Global Collaboration, and Disruption

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Abstract
This study aims to analyze the publication trends related to traditional sports and folk games from 1971 to 2025, with a focus on understanding the dynamics of research development in this field. The study uses bibliometric analysis, utilizing data from the Web of Science Core Collection. The data is then analyzed using VOSviewer software to map the relationships between frequently co-occurring keywords in the dataset. The findings show a significant increase in publications from 2018 onwards, with notable peaks in 2022 and 2025. Major contributions come from countries like China and the United States, while other countries like Indonesia show relatively lower contributions. The analysis highlights a growing focus on the intersection of traditional sports with digital technologies, particularly gamification and esports. Additionally, the visualization reveals key connections between concepts such as exercise, youth, and physical activity, alongside increasing attention to the role of social media and technology in promoting traditional sports. In conclusion, this research underscores the growing academic interest in traditional sports, particularly in the context of digitalization and technological innovation. The findings suggest that future research should further explore the integration of technology in the preservation and development of traditional sports. This study contributes to the understanding of global research trends and provides insights into the evolving role of digital tools in enhancing participation in traditional sports.

Keywords: Traditional sports; folk games; bibliometrics; digitalization; esports

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INTRODUCTION

Traditional sports and folk games constitute a critical component of intangible cultural heritage, embodying the historical, social, and ethical values of communities worldwide. These activities provide not only opportunities for physical engagement but also mechanisms for transmitting cultural norms, reinforcing social cohesion, and fostering identity formation (An & Nie, 2023; Ansharudin et al., 2022; Bjeljac et al., 2021). Despite the proliferation of modern sports, traditional sports continue to hold educational and cultural significance, especially in sustaining community-based practices and promoting participatory health behaviors. In recent decades, the globalization of culture and the emergence of digital technologies have generated new avenues for both preserving and transforming these traditional practices, highlighting a dual focus on heritage conservation and technological integration (Cao & Liu, 2024; Cardoso & De Almeida, 2023). Understanding the evolution of scholarly attention to traditional sports, including their adaptation through gamification and digital platforms, is therefore essential for

contextualizing contemporary trends in sports education, cultural studies, and physical activity research.

Despite their recognized cultural and educational relevance, the systematic mapping of research on traditional sports remains limited. Existing literature often emphasizes localized case studies, historical accounts, or ethnographic analyses, leaving gaps in the broader understanding of global research trends, geographic contributions, and thematic foci (Ahmad et al., 2023; Y. Chen et al., 2022). Furthermore, the rising prominence of digital interventions, such as esports and gamification, introduces a new dimension to traditional sports scholarship, yet few studies have quantitatively captured this transformation. The lack of comprehensive bibliometric analyses hinders the identification of key authors, influential journals, and collaboration networks that shape the field, particularly in countries with rich but underrepresented cultural heritage like Indonesia (Guntoro et al., 2024; Jariono et al., 2024). This absence of systematic evidence impedes strategic planning for cultural preservation, educational integration, and the adoption of innovative digital practices, thereby necessitating a rigorous investigation into the evolution and orientation of global scholarly outputs on traditional sports.

Addressing this research gap, the present study introduces a bibliometric approach to analyze publication trends, author contributions, and thematic developments from 1971 to 2025, utilizing data from the Web of Science Core Collection and VOSviewer software. Unlike prior research that predominantly examines localized phenomena or qualitative case studies, this study systematically maps global patterns of scholarly activity, highlighting the intersection between traditional sports, digital innovation, and educational practice (Da Costa et al., 2023; Ahn et al., 2024). The novelty of this investigation lies in its integration of digitalization and gamification as emergent research foci, its longitudinal analysis spanning five decades, and its synthesis of cross-disciplinary publication patterns. By visualizing co-occurring keywords and thematic clusters, the study captures both the cultural and technological dimensions of contemporary research, thus offering a multidimensional perspective absent in prior bibliometric or ethnographic studies (Febrianti et al., 2023; Handayani et al., 2022). This explicit combination of heritage and innovation underscores the study's contribution in identifying evolving knowledge structures and emerging priorities in the field.

The primary objective of this research is to provide a comprehensive overview of the development of traditional sports scholarship, with specific attention to publication trends, geographic distribution, influential authors, and the integration of digital technologies. The study examines peer-reviewed journal articles published in English, focusing on keywords, thematic clusters, and authorial networks to elucidate research directions, gaps, and collaborations. While the analysis is limited to English-language publications indexed in Web of Science, the scope allows for the identification of global patterns and thematic evolution, thereby offering insights relevant for policymakers, educators, and cultural practitioners. By linking bibliometric evidence to contemporary issues in digitalization and gamification, the study provides a foundation for further investigations into the preservation, transformation, and educational deployment of traditional sports. Ultimately, this research contributes to the understanding of how traditional sports evolve within academic discourse, bridging cultural heritage and technological innovation for contemporary educational and social practice.

METHOD

This study employs a quantitative approach with a bibliometric method to analyze publication trends related to traditional sports and folk games from 1971 to 2025. This method allows for the mapping of publication distribution, identification of key authors, and analysis of the relationships between concepts within the topic (Anzarwati & Rahayu, 2024; Burbano-Fernández et al., 2024; Fatimah et al., 2024). The data used is obtained from the Web of Science Core Collection and analyzed using VOSviewer to visualize the interconnections between frequently co-occurring keywords in the related literature.

Research Design

This study uses a quantitative design with a bibliometric approach to analyze scholarly publications focusing on traditional sports and folk games from 1971 to 2025. The aim of this approach is to describe trends, geographical distribution, key author contributions, and the relationships between relevant concepts within this topic. Bibliometrics enables the identification of patterns in publications and provides insights into the development and direction of research in this field (Ma et al., 2021).

Data Collection

The data collection process in this study began with a search for relevant literature using the keywords "traditional sports" and "folk games" in the Web of Science Core Collection. The initial search yielded 943 documents relevant to the research topic. Subsequently, a filtering process was applied to select journal articles published in English and with the document type 'ar' (article). This filtering resulted in 431 articles that met the criteria for further analysis. The filtering was based on two main criteria: Filter 1 for selecting journal articles with the document type 'ar', and Filter 2 for selecting documents published in English. This step ensures that the data analyzed has high relevance and good quality, in accordance with the goals of this study.



Figure 1. Research process for traditional sports and folk games

Descriptive Analysis

Descriptive analysis is used to illustrate the distribution of publications based on factors such as countries, authors, journals, and publishers. This technique provides a clear picture of the publication spread across various countries and relevant journals, as well as identifying the contributions of key authors in this research. Thus, this analysis allows researchers to identify the dominant countries and journals in publications, as well as the significant contributions from authors focusing on the topic of traditional sports.

Visualization Analysis With Vosviewer

After mapping the distribution of publications, visualization analysis is performed using VOSviewer to illustrate the relationships between keywords in the dataset (Dani Nandiyanto & Dewi, 2022). VOSviewer maps the co-occurrence of keywords, which are terms that frequently appear together in the analyzed publications (Febrianti et al., 2023; Handayani et al., 2022). This visualization allows researchers to identify the interconnections between concepts that emerge in research related to traditional sports and folk games. In the visualization, bright colors (yellow and green) indicate higher density relationships, while darker colors represent lower relationships. This analysis is highly useful in identifying emerging thematic trends within this topic and observing how related topics evolve over time

RESULT AND DISCUSSION

The distribution analysis of publications on traditional sports and folk games reveals a clear dominance of the People's Republic of China, with 153 publications, followed by the United States with 82 publications. Other countries such as the United Kingdom (26 publications), Australia (25), and Spain (20) show relatively lower contributions. Interestingly, Indonesia, which has a rich heritage of traditional games, has only recorded 9 publications.

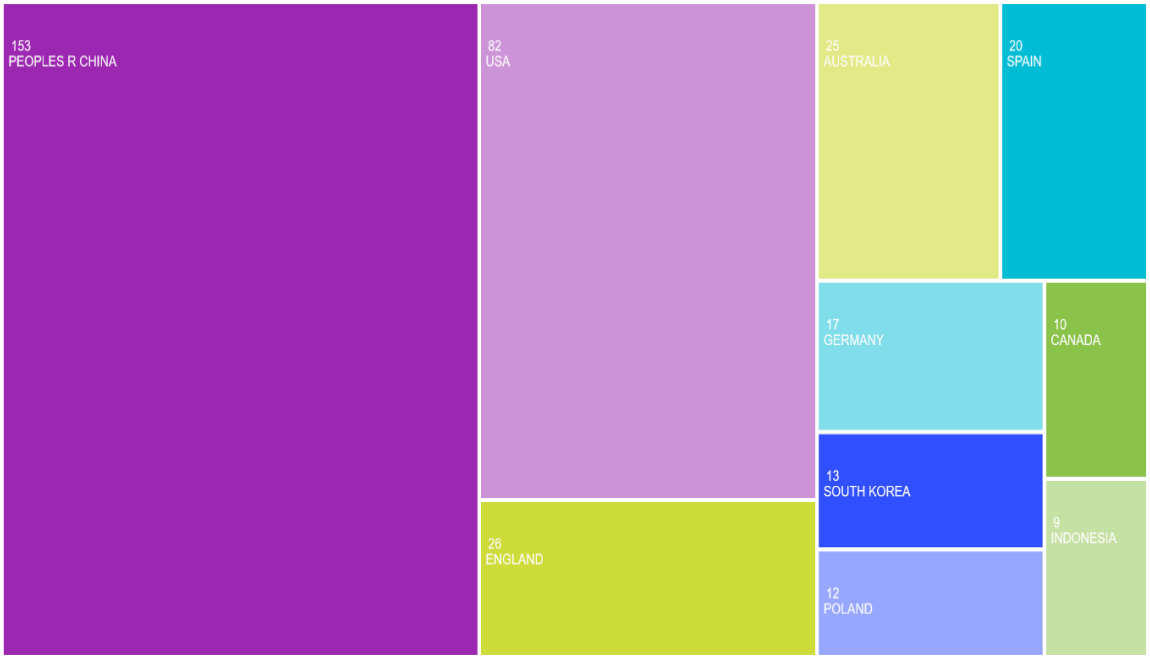


Figure 2. Analysis of publication contribution by country

These results indicate a concentration of research in countries with strong support for cultural research, including research funding, cultural diplomacy

strategies, and national policies supporting the preservation of culture. China, as the leading country in terms of publication count, seems to be heavily influenced by government policies that promote the preservation of intangible cultural heritage, including traditional sports, as part of national identity and international soft power. Meanwhile, the United States reflects a high academic interest in cross-cultural studies, sports anthropology, and interdisciplinary research, which is thriving in leading universities.

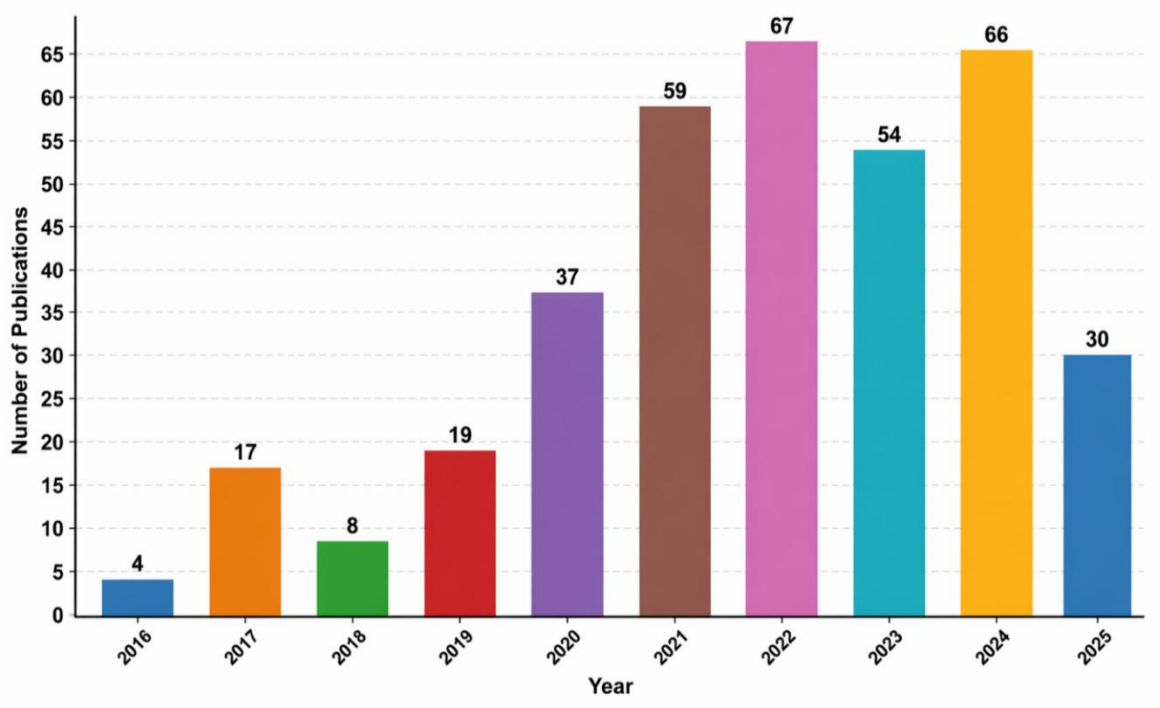


Figure 3. Analysis of publication distribution by year

The distribution of publications on traditional sports and folk games shows a significant upward trend in recent years, with a sharp increase noticeable after 2018. In the early part of the analyzed period, publication numbers were relatively low, with only 4 articles in 2016 and 8 articles in 2018. However, since 2019, the number of publications has consistently increased, reaching 37 publications in 2020, and continuing to rise to 59 publications in 2021, peaking at 68 publications in 2022. Although there was a slight decrease in 2023 (54 publications), the number is expected to rise again in 2024 (66 publications), and this positive trend is projected to continue into 2025, with 30 publications already recorded in the first eight months.

The surge in publications after 2020 can be seen as an indication of the growing global academic interest in this topic. This increase is likely driven by the heightened global awareness of the importance of preserving intangible cultural heritage. Additionally, government policy support in several countries, as well as the expanded access to publications in international journals, have contributed to the rise in publication numbers.

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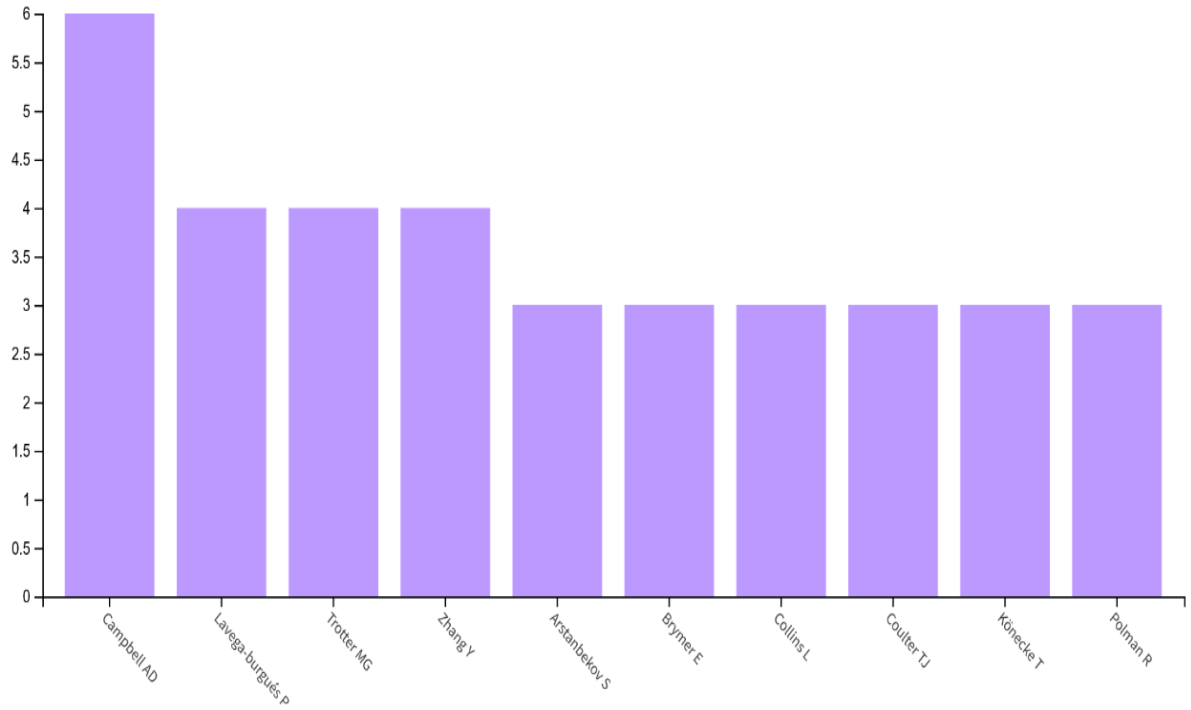


Figure 4. Analysis of author contribution

The distribution of publications by author reveals several key figures who have consistently contributed to the study of traditional sports and folk games. Campbell AD emerges as a central figure in this field, with a total of 6 articles, indicating a strong and ongoing research focus on traditional sports. This author likely adopts a multidimensional approach, encompassing cultural, educational, and policy aspects in his research. Other authors who have made significant contributions, each with 4 publications, are Lavega-Burgués P, Trotter MG, and Zhang Y, who have demonstrated active involvement in developing academic discourse across countries and disciplines.

A group of authors with 3 publications, including Arstanbekov S, Brymer E, Collins L, Coulter TJ, Könecke T, and Polman R, although contributing less, still play an important role in enriching research perspectives through specific case studies, international collaboration, and interdisciplinary approaches. This pattern suggests that although the field of research is fragmented, the productive key figures maintain diverse perspectives, with supporting authors continuously enriching the discourse on this topic. The dominance of several key authors reflects academic leadership in popularizing the topic of traditional sports and the potential creation of research hubs or specific research groups that become central knowledge production points.

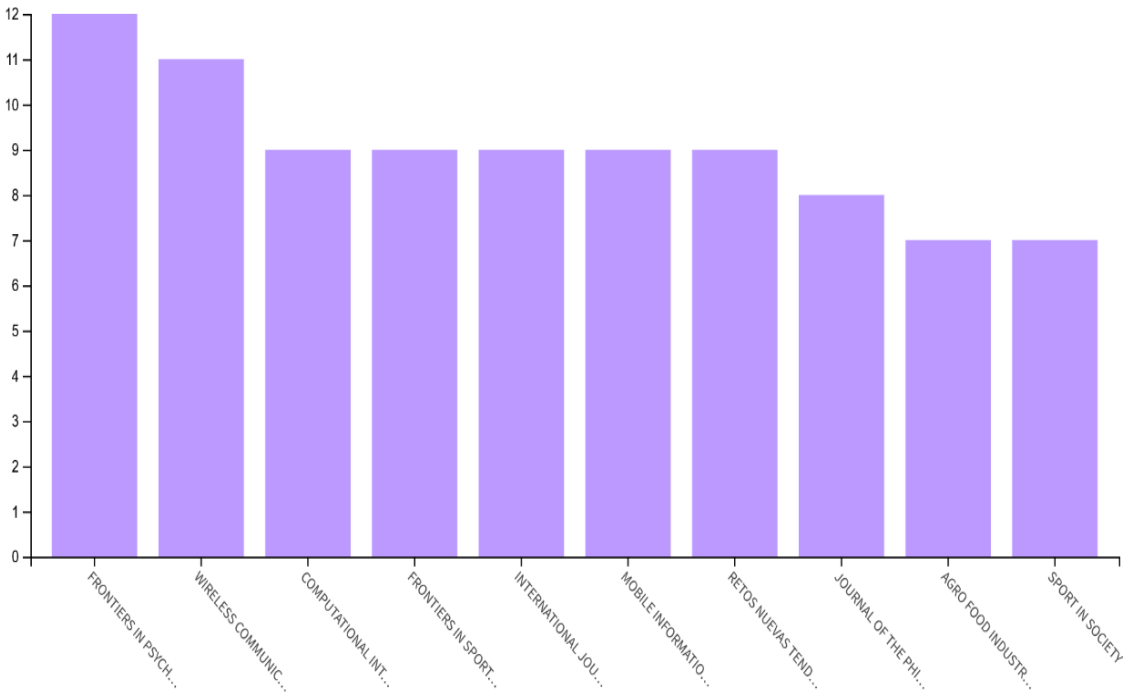


Figure 5. Analysis of publication contribution by journal purpose

The distribution of publications by journal title indicates that studies on traditional sports and folk games are disseminated across a wide range of disciplines, including psychology, information technology, sports, physical education, and industry. Frontiers in Psychology recorded the highest contribution, with 12 articles, followed by Wireless Communications and Mobile Computing with 11 articles.

Meanwhile, Mobile Information Systems, Computational Intelligence and Neuroscience, Frontiers in Sports and Active Living, International Journal of the History of Sport, and Retos: Nuevas Tendencias en Educación Física, Deporte y Recreación each published 9 articles. In addition, the Journal of the Philosophy of Sport published 8 articles, while Agro Food Industry Hi Tech and Sport in Society each contributed 7 articles.

This pattern suggests that publications on traditional sports are no longer confined to physical and sport-related dimensions alone, but have expanded into psychological, technological, educational, and social domains. Evidence of this multidisciplinary distribution is presented in Figure 5, which demonstrates that this topic has been widely published in journals representing diverse academic orientations.

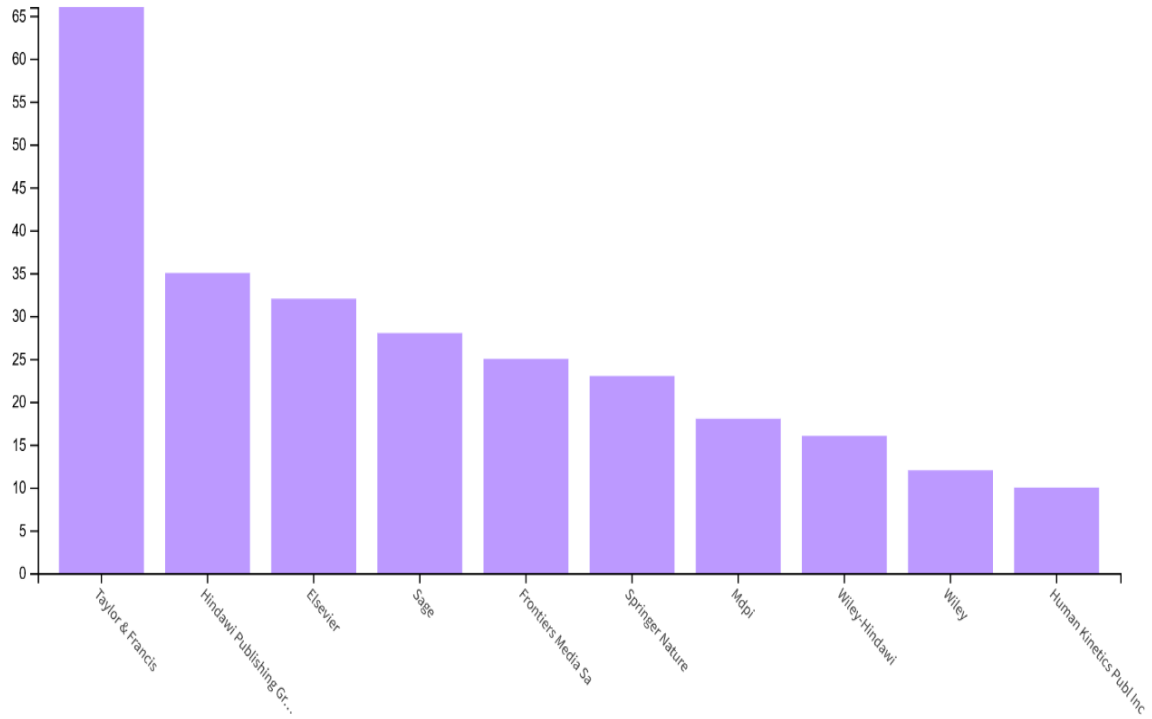


Figure 6. Analysis of publication contribution by publisher

The distribution of publications by publisher indicates that research on traditional sports and folk games is disseminated across several major international publishing houses, with Taylor & Francis emerging as the most dominant publisher, accounting for 66 publications. It is followed by Hindawi Publishing Group with 35 publications and Elsevier with 32 publications. Additional contributions are evident from Sage (28 publications), Frontiers Media SA (25 publications), Springer Nature (23 publications), MDPI (18 publications), Wiley-Hindawi (16 publications), Wiley (12 publications), and Human Kinetics Publishing Inc (10 publications).

This pattern suggests that publications on this topic are concentrated within reputable publishing houses, with a distribution that reflects the multidisciplinary nature of the research while also highlighting the substantial contribution of open-access publishers. Evidence of this distribution is presented in Figure 6, which illustrates the dominance of Taylor & Francis as well as the involvement of various other major publishers in the dissemination of research on traditional sports.

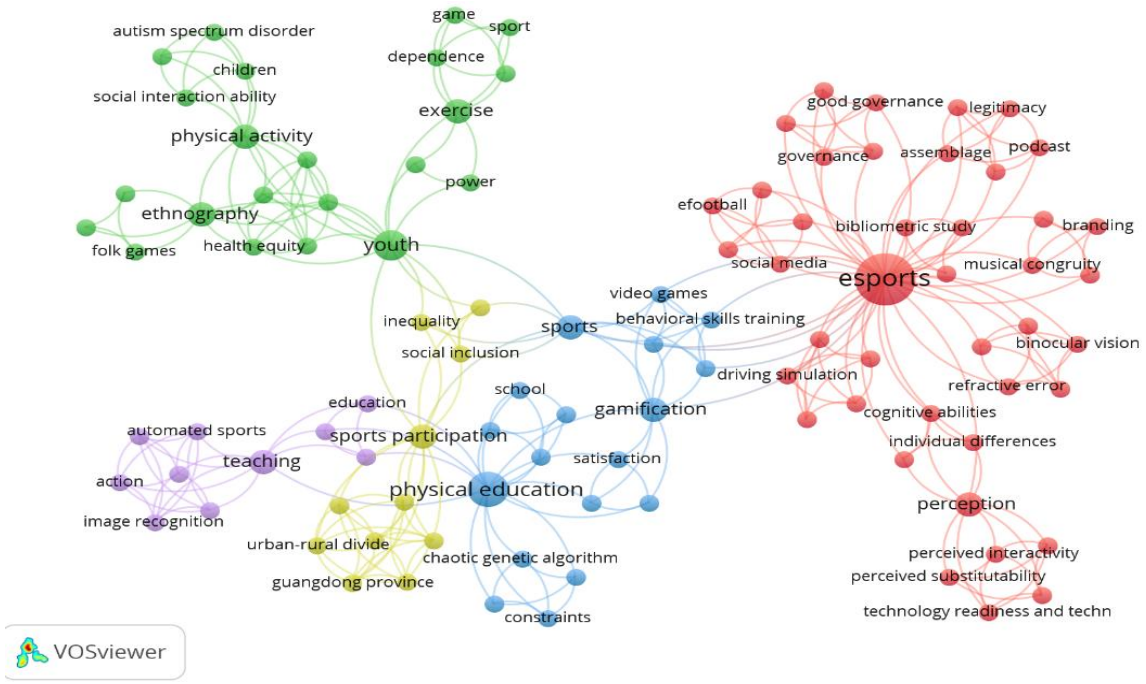


Figure 7. Network visualization based on keyword relationships

The keyword network visualization reveals strong interconnections among the concepts of sports, physical education, physical activity, and esports within research on traditional sports and folk games. As shown in Figure 7, keywords such as "exercise," "sport," "youth," and "physical activity" emerge as the central nodes of the network, indicating that the primary focus of this body of research lies in participation in physical activity, particularly among younger populations. In addition, terms such as "sports participation," "education," and "school" demonstrate a clear linkage to the context of physical education within school settings.

The visualization also highlights the presence of keywords such as "ethnography" and "folk games," suggesting that cultural and community-based approaches remain part of the scholarly discourse, although they are less prominent than the cluster centered on physical activity. On the other hand, the appearance of terms such as "gamification" and "esports" indicates that digital themes have also begun to intersect with research on traditional sports. Overall, the co-occurrence pattern presented in Figure 7 demonstrates that research in this field is concentrated on the interrelationship among physical activity, education, youth participation, and the integration of digital themes.

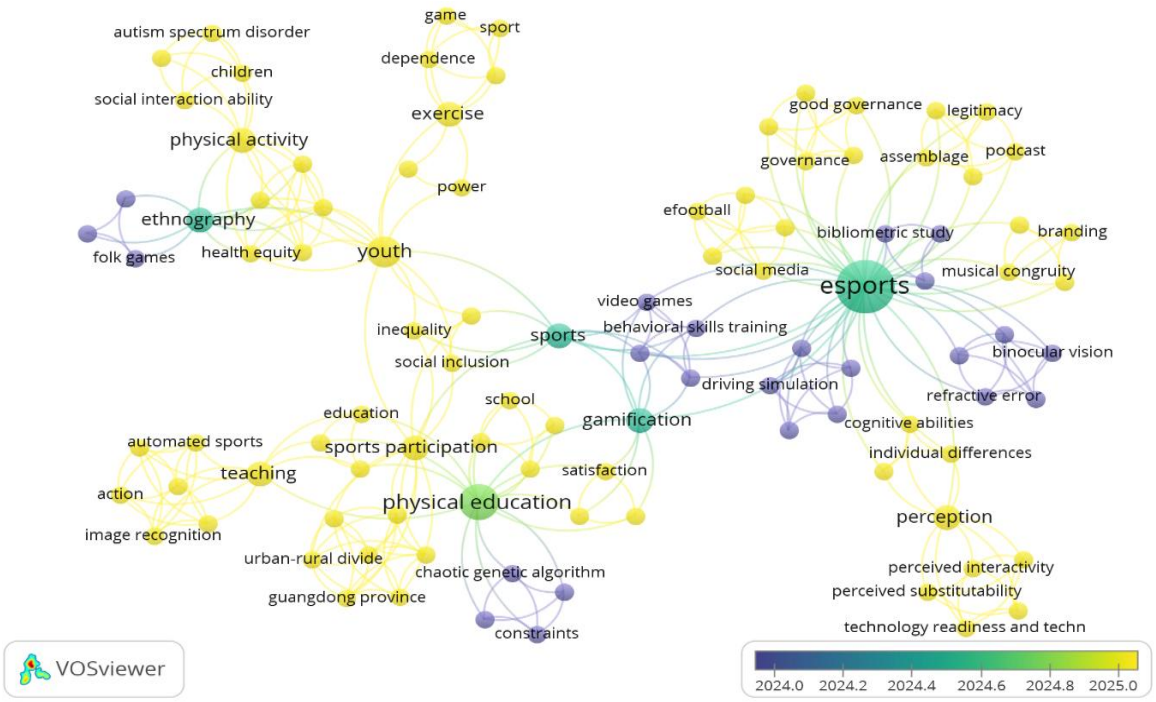


Figure 8. Visualization based on trends Evolution of keyword

The visualization produced by VOSviewer illustrates the relationships between keywords in the research dataset, showing the evolution of keyword trends between 2024 and 2025. Each point in the visualization represents a keyword that frequently co-occurs with others in the research, with color changes reflecting the evolution of these keyword trends over time. For example, at the beginning of 2024, keywords such as "ethnography," "health equity," "automated sports," "action," and "image recognition" emerged as the primary focus. This trend reflects an increased attention to ethnographic approaches in sports, health equity, and the application of automated technologies in the sports world.

By mid, 2024, terms like "sports participation," "gamification," "video games," and "social media" were discussed more frequently, indicating a shift in focus from traditional aspects of sports toward the application of gamification and digital sports. This represents a significant development toward the digitalization of sports and the influence of social media in enhancing physical participation, particularly among youth.

Towards the end of 2024 and into early 2025, there was a peak in attention toward terms like "esports," "cognitive abilities," "individual differences," "perceived interactivity," and "technology readiness", suggesting that esports and topics related to cognitive abilities and perceived interactivity will be the primary focus of research. This indicates that research in the field of esports and the influence of digital technology on traditional sports is becoming more dominant, showcasing a larger transformation in how traditional and digital sports interact.

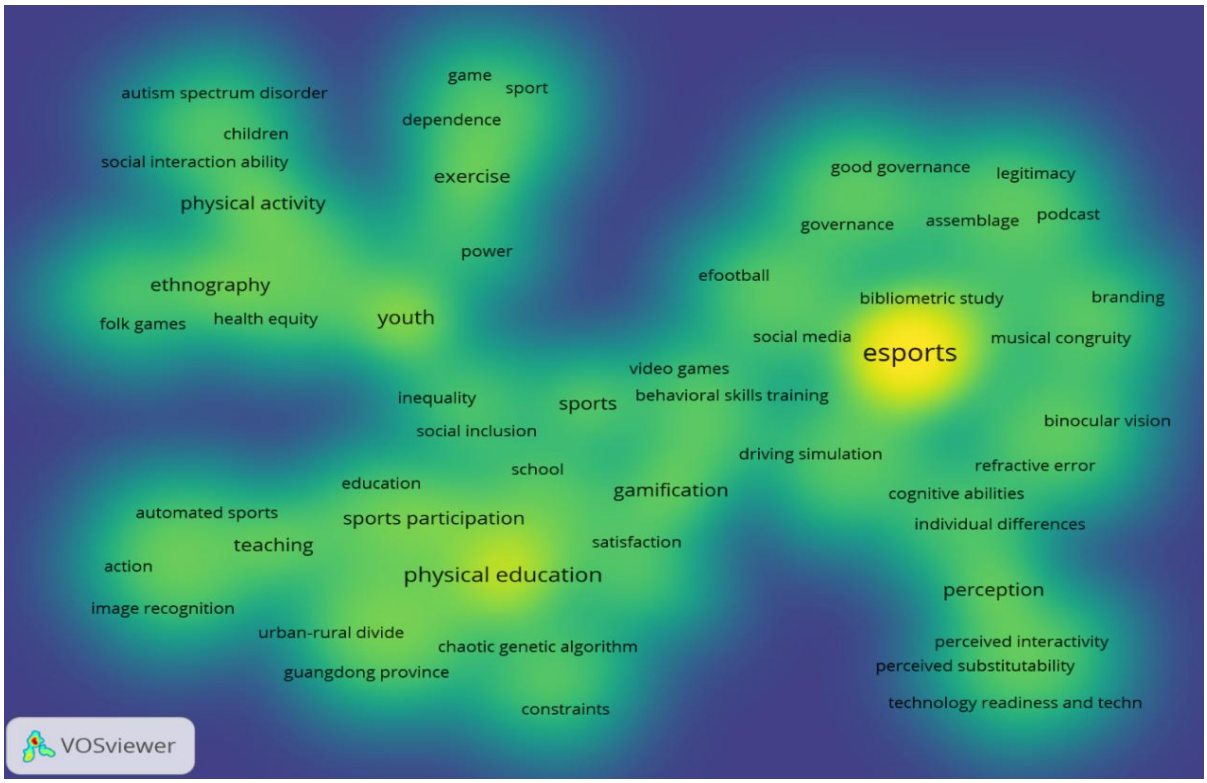


Figure 9. Overlay visualization of traditional sports and folk games

The overlay density visualization indicates that the most dominant topics in studies on traditional sports and folk games are centered on the terms “esports,” “video games,” “gamification,” “sports participation,” and “exercise,” which appear in bright colors (yellow–green) as indicators of the highest density. These data suggest that digital themes and sports participation constitute the core of keyword interconnections within the dataset. In addition, terms such as “physical activity,” “sports,” “youth,” “social inclusion,” and “social interaction ability” are located at a medium-density level, indicating that they still maintain fairly strong associations with the main thematic cluster.

In contrast, terms such as “ethnography,” “folk games,” and “chaotic genetic algorithm” appear in darker blue areas, signifying lower density and more limited interconnections. This pattern demonstrates that scholarly attention is increasingly concentrated on digital themes, interactivity, and sports participation, whereas ethnographic topics and traditional folk games appear to be relatively less prominent. Evidence of this finding is presented in Figure 9, which illustrates the density levels and relational positions of each keyword within the visualization.

DISCUSSION

Geographical disparities and the upward trend in publication output indicate that research on traditional sports has become part of the global academic agenda; however, its distribution remains uneven. The dominance of China and the United States suggests that knowledge production on traditional sports and folk games is stronger in countries with more established policy support, research funding, and international publication capacity. Within the framework of cultural globalization and soft power, this finding may be understood as reflecting state efforts to position intangible cultural heritage as a source of national identity legitimation as well as an instrument of international influence. This interpretation is consistent with studies

emphasizing the importance of cultural policy support and international visibility in shaping publication productivity (Choi et al., 2022; Hsieh et al., 2019).

However, this result also differs from studies that highlight the richness of traditional sports practices in local contexts, such as Indonesia, without showing comparable representation in global publication channels (Guntoro et al., 2024; Jariono et al., 2024). This discrepancy may be attributed to differences in access to international databases, the dominance of English, and disparities in research infrastructure. A limitation of this study lies in its reliance on the Web of Science and its restriction to English-language articles, which may reduce the representation of developing countries. The implication is that the preservation of traditional sports requires strategies for publication internationalization and cross-national collaboration so that the global narrative is not dominated solely by certain academic centers.

The concentration of contributions among a limited number of authors, journals, and publishers confirms that the development of this field is shaped by specific scholarly actors and dissemination channels. The dominance of several authors, such as Campbell AD, as well as the concentration of publications in major journals and publishing houses, indicates that the formation of the research agenda does not occur randomly; rather, it follows patterns of academic leadership, collaborative networks, and structures of scholarly dissemination. This is consistent with perspectives on scientific leadership and centers of knowledge production, which accelerate the development of a field through collaboration and intellectual influence (Bossmann et al., 2022; Brett et al., 2019). This finding is also in line with studies showing that dominant actors and major publishers play an important role in directing interdisciplinary academic discourse (Choi et al., 2022; Garcia et al., 2022).

However, the present findings differ from earlier studies that more frequently situated traditional sports within the domains of culture, physical education, or local preservation, because the journal landscape identified in this study reveals expansion into psychology, information technology, and industry (Hananingsih et al., 2024; Irfan et al., 2023; Kogoya et al., 2023). This difference may stem from the fact that bibliometric analysis captures a broader spectrum of publications than single-theme studies. Its limitation, however, is that publication counts do not automatically reflect the quality of scholarly influence, as they do not yet account for citations, centrality, or conceptual impact. The implication is that strengthening collaboration with core authors and expanding into multidisciplinary journals may accelerate the global development of traditional sports research.

The structure of the keyword network indicates that traditional sports are now understood not merely as cultural heritage, but also as a domain of physical participation, education, inclusion, and digital innovation. The interconnections among keywords such as exercise, sport, youth, physical activity, sports participation, education, school, gamification, and esports suggest that the research focus has shifted toward a more multidimensional orientation. From a theoretical perspective, this finding may be interpreted through the lenses of social motivation theory, social justice theory, and educational technology, as physical participation, inclusive access, and the use of digital elements appear to constitute the main pillars in the development of traditional sports (A. Chen et al., 2023; Jariono et al., 2024). This finding is consistent with studies showing that traditional

sports are increasingly discussed in relation to education, character development, psychology, and technology (Hananingsih et al., 2024; Hsieh et al., 2019).

However, it also differs from studies that place greater emphasis on the functions of cultural heritage, community identity, and the ethnographic preservation of tradition (An & Nie, 2023; Bjeljac et al., 2021; Fitri et al., 2020). The difference lies in the focal point: earlier studies primarily foreground cultural meaning, whereas the present bibliometric findings indicate growing attention to participatory, educational, and digital functions. This divergence may be explained by the broadening of research issues, the changing needs of younger generations, and the increasing integration of technology into physical education. A limitation of this study is that co-occurrence analysis does not fully capture the depth of conceptual meaning. The implication is that the future development of traditional sports should be designed as a cultural practice that remains relevant to education, health, and digital participation.

The evolution and density of keywords reveal a paradigmatic shift from ethnographic approaches toward digitalization, gamification, and esports. The transition from keywords such as ethnography and folk games to gamification, video games, social media, esports, cognitive abilities, and technology readiness indicates that traditional sports are increasingly being interpreted within the framework of digital interactivity and technological transformation. The significance of this finding lies not merely in a change of topic, but in a shift in epistemic orientation: from documentation and preservation toward adaptation, engagement, and innovation. This finding is in line with game-based learning theory and the digitalization of sports, both of which explain that digital game elements can enhance motivation, interactivity, and participation (Adegoke et al., 2022; Geertsema et al., 2021).

The result is also consistent with studies demonstrating the growing role of gamification and digital technology in sports education (Abduh et al., 2023; Hsieh et al., 2019). Nevertheless, this finding differs from studies that continue to position folk games primarily as a medium for transmitting cultural values and local identity (Bjeljac et al., 2021; Fitri et al., 2020; Kogoya et al., 2023). The difference lies in orientation: earlier studies focused on preservation, whereas the present findings emphasize transformation and digital adaptation. This shift may be attributed to changing preferences among younger generations, the influence of social media, and the increasing dominance of digital platforms in contemporary sports experiences. A limitation of this study is that trend visualization is highly dependent on keyword standardization and database coverage. The implication is that the integration of technology into traditional sports should be directed not only toward increasing participation, but also toward preserving cultural authenticity so that digitalization does not erase their traditional meaning.

CONCLUSION

This study provides a comprehensive bibliometric synthesis of research on traditional sports and folk games, addressing the evolution of publication trends, thematic focus, and the integration of digital technologies from 1971 to 2025. The findings confirm a pronounced shift in research orientation, revealing that traditional sports are increasingly framed not only as cultural heritage but also as domains of physical participation, educational engagement, and digital innovation. The prominence of gamification, esports, and technology-mediated approaches

highlights the adaptation of traditional sports to contemporary societal and technological contexts, demonstrating their potential to enhance youth participation, inclusivity, and motivation in physical activity.

The study's significance lies in elucidating the structural dynamics of knowledge production in this field, including the roles of leading authors, journals, and publishers in shaping research agendas. These insights contribute to the theoretical understanding of the interplay between cultural preservation, educational practice, and technological innovation, offering a multidimensional perspective on the transformation of traditional sports research. Methodologically, the application of bibliometric mapping provides a replicable framework for analyzing thematic evolution and research collaboration patterns across disciplines and geographies.

Despite its comprehensive scope, the study is limited by its reliance on English-language publications indexed in the Web of Science, which may underrepresent contributions from non-English-speaking regions and local contexts. Future research should explore cross-linguistic and culturally diverse datasets, investigate the practical implementation of technology in sustaining traditional sports, and examine the impact of digital engagement on participants' physical and cognitive outcomes. By integrating these dimensions, subsequent studies can further inform policies and practices that balance cultural preservation with innovation in physical education and sports management.

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