

TALENT: BIBLIOMETRIC REVIEW OF THE TERM AND ITS RELATIONS WITH WATER POLO STUDIES

TALENTO: REVISÃO BIBLIOMÉTRICA DO TERMO E SUA RELAÇÃO COM OS ESTUDOS SOBRE POLO AQUÁTICO

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CONTATO

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Resumo: Esta análise bibliométrica examinou as tendências globais de pesquisa sobre talento e integrou esses achados com conceitos e práticas específicas do polo aquático. Objetivo: Investigar a produção científica a respeito do talento e discutir as implicações para o desenvolvimento do polo aquático. Método: O estudo abrangeu 2.452 artigos e utilizou o software VOSviewer para visualização e análise. As palavras-chave para a análise bibliométrica foram Talento (*Talent*), Esportes (*Sports*), Desenvolvimento (*Development*) e Carreira (*Career*). Resultados: A análise revelou que o Reino Unido, os Estados Unidos e a Austrália são os países mais prolíficos em termos de volume de publicações. Os veículos de divulgação científica de alto impacto incluem o *International Journal of Sports Science and Coaching* e o *Journal of Sports Sciences*, os quais apresentam a maior concentração de pesquisas sobre o tema. Análise de rede de co-ocorrência de palavras-chave delineou quatro clusters temáticos principais: (i) Aspectos Quantitativos e Demográficos: focando na mensuração e em características populacionais. (ii) Desenvolvimento em Estágios Iniciais: concentrando-se no desenvolvimento e na identificação de talentos durante as fases iniciais da vida. (iii) Interação Personalidade-Treinamento: investigando a complexa interação entre os traços de personalidade individuais e as metodologias de treinamento. (iv) Desafios da Trajetória de Carreira: explorando os obstáculos e as dinâmicas relacionadas à retenção e ao desenvolvimento de talentos a longo prazo. Interpretação: as conexões temáticas identificadas possuem significativa relevância teórica e prática para o avanço dos

campos da ciência do esporte e, mais especificamente, para as estratégias de desenvolvimento do polo aquático.

Palavras-chave: bibliometria; esportes aquáticos; aptidão.

Abstract: To map the scientific landscape of talent research, this bibliometric analysis examined global research trends and integrated these findings with water polo-specific concepts and practices. Aim: To investigate scientific production regarding talent and to discuss the implications of the findings for water polo development. Method: The study encompassed 2,452 articles and utilized VOSviewer software for visualization and analysis. Keywords for bibliometric analysis were Talent, Sports, Development, and Career. Results: The analysis revealed that the United Kingdom, the United States, and Australia are the most prolific countries in terms of publication volume. High-impact scientific dissemination vehicles include the *International Journal of Sports Science and Coaching* and the *Journal of Sports Sciences*, which feature the highest concentration of research on the topic. A network analysis of co-occurring keywords delineated four primary thematic clusters: (i) Quantitative and Demographic Aspects: Focusing on measurement and population-level characteristics. (ii) Early-Stage Development: Concentrating on the development and identification of talent during early life stages. (iii) Personality-Coaching Interaction: Investigating the complex interplay between individual personality traits and coaching methodologies. (iv) Career Trajectory Challenges: Exploring obstacles and dynamics related to long-term talent retention and development. Interpretation: The identified thematic connections have significant theoretical and practical relevance for advancing the fields of sports science and, more specifically, water polo development strategies.

Keywords: Bibliometrics; Water Sports; Aptitude.

INTRODUÇÃO

The concept of talent, far from being a static or purely innate trait, is widely understood as a multifaceted and dynamic phenomenon that manifests and evolves throughout an athlete's lifespan (BAKER, WATTIE, SCHORER, 2019). Previous study (GÜLLICH, 2014) further distinguishes this through two categories: (i) static talent, focused on immediate measurable performance, and (ii) dynamic talent, which encompasses the holistic cognitive and psychosocial skills necessary for sustained, long-term success. Contemporary literature (BAKER, WATTIE, SCHORER, 2019; CHRISTENSEN, 2009) has shifted from subjective assessments toward objective, evidence-based methodologies to enhance accuracy and equity in talent selection processes. Within this framework, biological maturation is a critical determinant of motor and physical development, specifically coordination, strength, power, and aerobic endurance (MALINA, BOUCHARD, BAR-OR, 2004). Talent scientific knowledge remains problematic due to the non-linear interaction between immediate performance, biological maturation, and the relative age effect, which often obscures long-term potential. Understanding these intrinsic and extrinsic factors is essential for optimizing long-term development and designing periodized training programs tailored to different maturational stages (DONTU et al., 2021).

To study talent, bibliometric analysis provides a robust, quantitative framework to evaluate scientific progress objectively, surpassing the limitations of narrative reviews. By applying statistical methods, it maps a field's intellectual structure, identifies emerging trends, and visualizes global collaboration networks (ARAÚJO, 2006). Furthermore, this method relies on quantitative analyses aimed at measuring the output, dissemination, and structure of scientific knowledge (LACERDA, ENSSLIN, ENSSLIN, 2012). Following the definition of the specific knowledge domain, a crucial step involves the careful selection of keywords utilized in the systematic search for relevant references (LACERDA, ENSSLIN, ENSSLIN, 2012). The key observable parameters typically selected for quantitative analysis in this type of review include (ENSSLIN, 2010): (i) Selected articles and their characteristics; (ii) most relevant journals (sources of publication); (iii) publication period (temporal distribution); (iv) country productivity (geographic output); (v) density of terms (conceptual structure); and (vi) relationship with other thematic topics (interdisciplinary connections).

Research on water polo talent remains scarce, likely due to the sport's aquatic complexity. Water polo demands a broad repertoire of physiological, motor, and cognitive competencies (PLATANOU, 2006). Success requires technical proficiency in locomotion (e.g.,

eggbeater kick and sculling) and superior ball control (ALCARAZ et al., 2012), alongside tactic-cognitive skills like rapid decision-making (TUCHER et al., 2014). Consequently, long-term athlete development must begin in childhood to progressively refine these capacities (CANOSAA, GARGANTA, FERNANDES, 2009). Crucially, the rate of improvement is heavily influenced by biological maturation, which must be considered in training periodization (SINGH et al., 2021).

To rigorously investigate the current scientific production landscape regarding talent, a bibliometric review methodology was adopted in this study. Given the relative scarcity of research specifically addressing 'talent' or 'long-term athlete development' within the context of water polo, this study adopted a broader focus on the construct of 'talent' in general, subsequently establishing theoretical and practical correlations with water polo. The goal was to investigate scientific production regarding talent and to discuss the implications of the findings for water polo development based on current literature. While talent research is extensive, its conceptual organization and thematic structure remain unclear to applied sports such as water polo. Bibliometric analysis offers a powerful tool to understand how knowledge is structured, which can guide evidence-based practices in specific sports contexts. While talent research is extensive, its conceptual organization and thematic structure remain unclear to applied sports such as water polo. Bibliometric analysis offers a powerful tool to understand how knowledge is structured, which can guide evidence-based practices in specific sports contexts.

METHODS

Database Selection

Bibliographic research was systematically executed in March 2025. The Scopus database was selected for this review due to its extensive indexing coverage and broad scope of scholarly literature (SINGH et al., 2021), ensuring high relevance and comprehensive data capture.

Search Query and Filtering

The search strategy employed a combination of English keywords relevant to the study's focus, utilizing Boolean logic (AND/OR). Considering that the goal was to investigate scientific production regarding talent, not specifically in water polo, the keywords included: “talent”; “talent identification”; “talent development”; “talent sport”. The search was constrained to a temporal window spanning from 1985 to 2025. Initially, the broad search yielded 3,335

documents. To ensure the rigor of the bibliometric analysis, a stringent document type filter was applied: only scientific articles were retained, with all other document types (e.g., books, book chapters, conference proceedings) being excluded. Following this filter application, a final dataset of 2,452 articles was selected for analysis.

Data Analysis

To investigate the research field associated with the term "talent," advanced bibliometric techniques were employed (ARAÚJO, 2006). These techniques facilitated the exploration and quantitative analysis of large datasets, thereby revealing underlying patterns, temporal trends, and key insights within the literature.

Analytical Procedures

The analysis was divided into two main categories:

1. **Performance Analysis:** This procedure was utilized to provide a descriptive overview of the research output. Key metrics examined included the total number of publications (annual output), the most influential journals, the defined publication period, and the countries exhibiting the highest contribution to research in this domain.
2. **Scientific Mapping (Network Analysis):** This technique was employed to visualize the structural relationships and clusters inherent in the data. Scientific mapping was applied to publications, journals, and keywords, providing a clear visual representation of the scientific landscape of "talent" research.

Software and Interpretation

The bibliometric analysis was executed using the specialized software VOSviewer 1.6.19, developed by Leiden University (The Netherlands). The findings obtained were interpreted strategically to identify emerging trends and critical thematic clusters, strictly adhering to the methodological guidelines of the BIBLIO protocol (MONTAZERI et al., 2023).

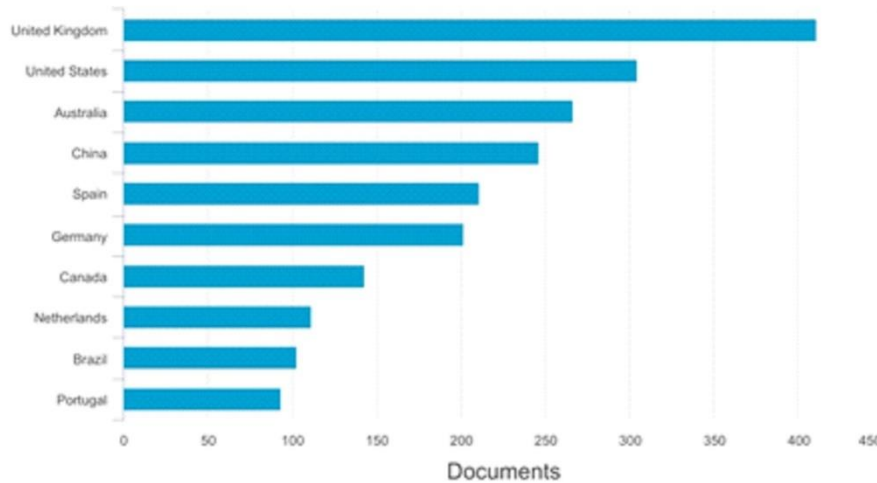
RESULTS AND DISCUSSION

Geographic Scientific Output.

Figure 1 provides a descriptive analysis of the scientific production volume concerning talent research categorized by country. The analysis reveals that the three countries contributing the highest volume of scientific publications on this topic are: United Kingdom (UK), United States (USA), and Australia. These nations collectively demonstrate the most substantial research commitment and output in the field of talent identification and development. Brazil is also positioned among the top ten most productive countries, ranking 9th overall. The country

contributed a total of 110 articles to the dataset, signifying a notable presence in the global research landscape for this area.

Figure 1: Number of articles on the topic by country, between 1985 and 2025.



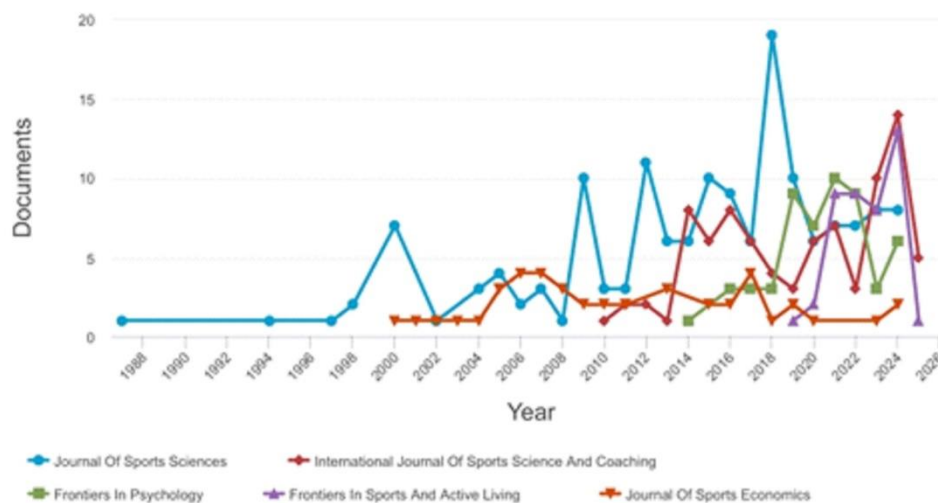
Source: Scopus database (2025).

Key Publication Sources and Temporal Trends

Figure 2 illustrates the leading sources of articles concerning the theme of "talent" and details the chronological distribution of their contributions. The analysis highlights two distinct periods of high scientific output in specific journals:

- **Peak Single-Journal Output (2018):** A significant spike in productivity was observed in 2018 within the *Journal of Sports Sciences*, which published 20 articles related to talent research. This volume represents a major single-year contribution from a key disciplinary journal.
- **Recent High-Volume Output (2024):** In the current period (2024), a notable volume of 14 articles has been published across two prominent journals: the *International Journal of Sports Science and Coaching* and *Frontiers in Sports and Active Living*. This demonstrates the sustained and geographically diverse interest in the topic in contemporary literature.

Figure 2: Articles by journals on the topic, since 1985.



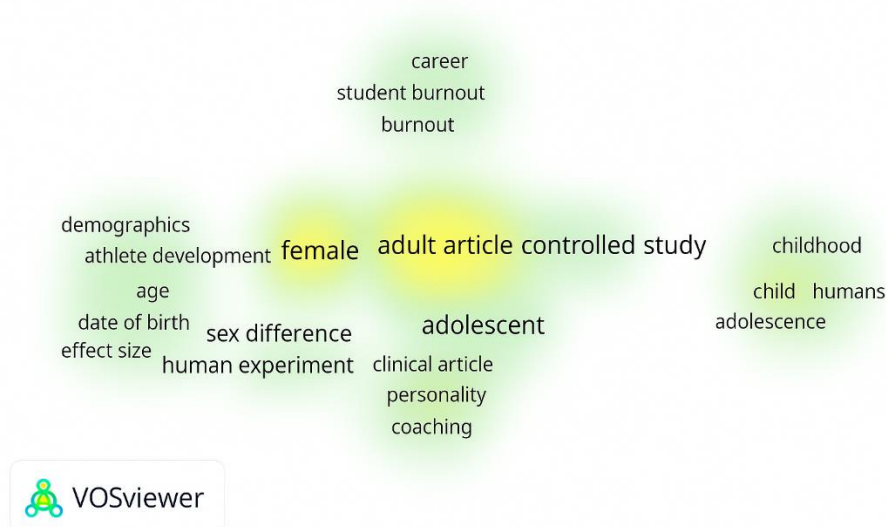
Source: Scopus database (2025).

Thematic Mapping and Research Density

Figure 3 presents a density map of scientific production related to "talent," where the intensity of the colors reflects the concentration of research around specific term groupings. The more vibrant the color, the higher the concentration of scholarly activity in that thematic area. The map successfully delineates seven distinct groupings or clusters. The central grouping, exhibiting the highest density (most vibrant color), is characterized by the co-occurrence of the terms: "adult," "article," "adolescent," and "controlled study." This strong concentration indicates a predominant focus on empirical research (controlled studies) involving samples from both adolescent and adult populations within the published literature. The analysis of the density map allows for the identification of areas of high research interest and concentration in the field of "talent," revealing relevant trends and foci. Other noteworthy groupings include other relevant groupings include: (i) "Career", "student burnout" and "burnout": Evidence of interest in the relationship between talent, career development and the

phenomenon of burnout, especially in the youth context (JIANG, WANG, 2025); (ii) "Age", "athlete development", "birthday" and "size effect": Points to the importance of chronological and relative age in the development of sports talents (LIMA et al., 2023); (iii) "Childhood", "child", "adolescence" and "skills": Highlights the study of skill development in early stages of life (MARCONE, BORRONE, CAPUTO, 2021).

Figure 3: Density map of scientific production on the topic "talent".

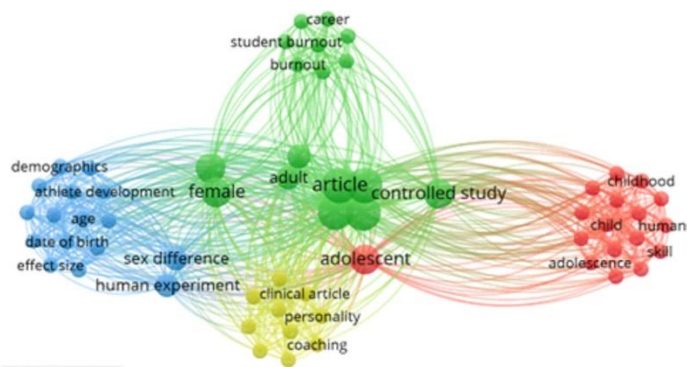


Source: Scopus database (2025).

Keyword Co-occurrence Network and Thematic Clusters

Figure 4 presents the keyword co-occurrence network, which graphically illustrates the complex interconnections between various research themes, grouped into four distinct thematic clusters. This network provides a comprehensive view of the relationships between the multiple concepts addressed, allowing for a deeper, more contextualized analysis of the sports research universe.

Figure 4 - Network of key terms illustrating the complex interconnections between different themes, grouped into distinct clusters.



Source: Scopus database (2025).

In Figure 4, the Blue Cluster highlights the centrality of chronological and relative age in sports research. It features terms such as "age," "development," "athlete development," "gender difference," and "relative age effect," underscoring critical population-level implications in the sports context (XIA, ZHANG, 2025; SCHORER et al., 2025). The Red Cluster emphasizes the crucial importance of the early stages of life and the need for comprehensive psychological monitoring. It focuses on terms like "adolescence," "childhood," "maturation," "psychology," and "training" within sports development programs (KRIŽALKOVIČOVÁ et al., 2024; NG et al., 2024).

The Yellow Cluster demonstrates the diversity of performance-influencing factors, covering environmental, demographic, and psychological elements. Key terms include "coaching," "competition," "gender," "adult," "youth," "soccer," and "personality," indicating a broad coverage of variables impacting sports performance (CARNEVALE et al., 2022; QUARTIROLI, FOGAÇA, WAGSTAFF, 2023). Finally, Green Cluster exhibits the greatest interconnection with the other clusters, highlighting the relevance of mental health (burnout), gender equality, and the school environment. This cluster encompasses terms such as "adult," "burnout," "female," "male," "school," "sport," "identification," and "athlete," placing emphasis on critical developmental contexts and well-being (ABARGHOUINEJAD et al., 2021; YU, XING, YANG et al., 2025). This network analysis clarifies the structural organization of talent research, confirming the multidimensional nature of the concept as it intersects with developmental, psychological, and environmental factors.

This study successfully investigated the landscape of scientific production concerning talent through a bibliometric review, providing a comprehensive overview of influential countries, key trends, and main research themes. The findings reinforce the multidisciplinary nature of talent research and highlight its complexity, particularly when applied to the

specialized context of water polo. The analysis highlights that the main countries driving scientific research on "talent" are the United Kingdom, the United States of America, and Australia. Brazil is also a notable contributor, ranking ninth overall in publication volume.

The most prolific journals in the dataset were the *International Journal of Sports Science and Coaching* and *Frontiers in Sports and Active Living* in 2024, alongside a significant output spike in the *Journal of Sports Sciences* in 2018. The network analysis of keywords related to "talent" reveals a complex structure of interconnections, where terms function as interconnected nodes forming distinct clusters. This structure confirms the multifaceted nature of the talent concept, as relationships are intense within clusters but weaker, yet present, between them.

1. Blue Cluster: Quantitative and Demographic Foundations

The Blue Cluster highlights the importance of quantitative and demographic aspects in talent development. Terms like "age," "date of birth," and "relative age effect" emphasize the influence of population characteristics, while "cohort analysis" and "mathematical analysis" point to the necessity of longitudinal and statistically rigorous methodologies (GUEVARA-ARAYA et al., 2024; LARKIN, WIJEKULASURIYA, GREER, 2025; ZHANG et al., 2025). Thus, regardless of the sport, talent analysis requires considering general demographic aspects and longitudinal modeling rather than a simple cross-sectional approach. These findings have significant implications for the field of water polo, specifically: water polo research, which increasingly explores the relative age effect, gender differences, and biometric variables in selection and evaluation processes (PLATANOU, 2006; LUPO et al., 2014). The emphasis on robust quantitative methodologies (LUPO et al., 2014; RUIZ, TORRE, GARCIA, 2022) reinforces the need for longitudinal and comparative perspectives in this sport.

2. Red Cluster: Developmental and Psychological Processes

The Red Cluster gathers terms like "adolescence," "childhood," "maturation," "psychology," and "training," underscoring the fundamental role of early life stages in sports development. Maturation is recognized as a critical biological process that necessitates the adaptation of training methods to individual developmental stages (MALINA, BOUCHARD, BAR-OR, 2004). Thus, analyzing talent (particularly motor talent), enquires a comprehensive understanding of human developmental aspects. Furthermore, these issues are central to ensuring appropriate training progression aligned with specific developmental stages. These results are particularly relevant to water polo in key aspects, as the foundation for physical and

psychological performance is largely established during childhood and adolescence (LUPO et al., 2014; RUIZ, TORRE, GARCIA, 2022). The cluster reinforces the crucial need for psychological support and individualized training strategies to address the emotional and biological challenges inherent in this demanding team sport (PLATANOU, 2006).

3. Yellow Cluster: Personality and Coaching Interplay

The Yellow Cluster highlights the interplay among "clinical article," "personality," and "coaching," advocating for a multifaceted approach. These findings underscore the need for talent identification and development frameworks that integrate the psychological dimensions of the participants involved. Personality traits such as resilience and teamwork significantly influence performance in water polo (RUIZ, TORRE, GARCIA, 2022; ESCALA-GARCIA, MANCHADO, TORTOSA-MARTINEZ, 2023). The literature emphasizes that coaches adopting individualized strategies, tailored to the athlete's psychological profile, enhance talent development (MACNAMARA et al., 2010). Neste sentido, a habilidade do treinador em ajustar o ambiente de treino às necessidades psicossociais individuais funciona como um catalisador para a excelência esportiva (JOWETT; COCKERILL, 2003). Furthermore, clinical studies on socioemotional development underscore the value of personalized interventions that integrate clinical insights, personality assessments, and coaching techniques to optimize both performance and well-being (JEONG et al., 2023).

4. Green Cluster: Career, Well-being, and Context

The Green Cluster focuses on concerns with talent development in contexts of pressure, challenge, and long-term sustainability, featuring terms like "career," "student," "burnout," "female," and "school". These results are consistent with the patterns observed in the preceding clusters: the necessity of longitudinal modeling, the role of biological maturation, and the critical influence of personality traits, none of which should be neglected during adolescence. Considering water polo, this cluster aligns with studies emphasizing the importance of career management and academic planning for athletes. It highlights the specific obstacles faced by water polo athletes (especially women and adults) related to training overload and balancing athletic and personal life, which elevates the risk of burnout (ALCARAZ, ABRALDES, FERRAGUT, 2017; BÖHLKE, BERTOLDO, 2020). The prominence of "controlled study" reinforces the demand for multidisciplinary interventions supported by robust scientific

evidence to promote sustained athlete well-being (MARTINENT et al., 2018; MOORE, SULLIVAN, 2022).

This study mapped the global scientific production on talent in sport using a bibliometric approach, providing an overview of the main countries, journals, and thematic structures that organize this field of research. The analysis revealed that talent-related studies are structured around four major interconnected thematic clusters, addressing quantitative and demographic aspects, early developmental processes, personality and coaching interactions, and career and wellbeing issues, reinforcing the understanding of talent as a multidimensional and dynamic construct in contemporary sports science. Although the present review did not analyze water polo literature as a distinct body of production, the identified thematic structure offers a conceptual framework that may help interpret and organize discussions about talent development in this sport from a broader developmental, psychological, and contextual perspective.

One limitation of this study is the absence of a modality-specific bibliometric analysis, which prevents direct inferences about the internal structure of water polo research itself; therefore, future studies should conduct bibliometric and systematic reviews focused specifically on water polo, as well as empirical investigations addressing long-term athlete development, biological maturation, and psychosocial factors in this sport.

CONCLUSION

This bibliometric review contributed to the organization of knowledge on talent in sport and provides a coherent conceptual reference that may support more integrated and evidence-informed research agendas in applied sports contexts such as water polo.

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