

# INSPIREE: INDONESIAN SPORT INNOVATION REVIEW



ISSN 2746-6965 (Online), 2774-2520 (Print)  
 Journal Homepage: <https://inspiree.review/index.php/inspiree>

## BIBLIOMETRIC ANALYSIS ARTICLES

OPEN

## Bibliometric Analysis of Sports Mental Toughness and Sports Self-esteem

<https://doi.org/10.53905/inspiree.v7i01.164>

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### ABSTRACT

**The purpose of the study.** Participate in elite sports requires a well-prepared long term training under favourable and unfavourable environments, both physically and mentally preparation of an athlete. However, psychological aspects like sports self-esteem and mental toughness are often neglected in sports performance. The present study was conducted to find out whether the trends of two important psychological factors affect the athlete performance or not.

**Materials and methods.** The bibliometric data was collected from the Web of Science database by searching two keywords "sports mental toughness" and "sports self-esteem." The obtained data was then visualized through VosViewer 1.6.20. The study was conducted from 1991 to 2025.

**Results.** The result showed that there were 2071 and 526 publications on sports self-esteem and sports mental toughness, respectively. The publications were increased with time for both the keywords, indicating growing research interest in particular topics.

**Conclusions.** In order to enhance sports performance in relation to mental toughness and self-esteem, more research should be done nationally, to meet the gap of research study like contant specific understanding, each other influences, and understanding of coach-athletes relationship.

### ARTICLE INFO

#### EDITED BY

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#### ARTICLE HISTORY

Received : November 12, 2025.  
 Accepted : January 17, 2026.  
 Published: January 27, 2026.

#### CITATION

Hossen, F. ., Das, P. K. ., & Mitra, M. (2026). Bibliometric Analysis of Sports Mental Toughness and Sports Self-esteem. *INSPIREE: Indonesian Sport Innovation Review*, 7(01), 23-30.

<https://doi.org/10.53905/inspiree.v7i01.164>

**Keywords:** bibliometric analysis; mental toughness; self-esteem; vosviewer; network visualisation map.

### INTRODUCTION

General concept of sports psychology is the scientific knowledge of how people behave, think, and feel during physical and sports activities (Lochbaum et al., 2022; ÖNER, 2023). This field encompasses a wide range of psychological principles applied to enhance athletic performance, training adherence, and overall well-being in sports contexts. Recently, observations in sports psychology have gained more significance because of its proven role in enhancing sports performance (Latinjak & Hatzigeorgiadis, 2021; Reyes-Bossio et al., 2022). With increasing competitive demands in elite sports, athletes and coaches are recognizing that mental preparation is as critical as physical conditioning. Psychological ideas and theories, such as goal-setting, imagery, self-talk, and cognitive-behavioral techniques, are being applied to optimize athlete performance at the highest levels (Didymus, 2018; McCormick et al., 2015; Singh et al., 2023). These interventions help athletes manage pressure, maintain focus, and recover from setbacks, ultimately leading to superior outcomes in competitions.

Physical and motor skills serve as the basic indicators for good athletes, but psychological characteristics are also crucial for achieving and sustaining optimum performance (Huang, 2023; McCormick et al., 2015). For instance, factors like motivation, concentration, and emotional regulation can determine the difference between victory and defeat in high-stakes events. The development of personality, mental toughness, and performance represents three core areas of sport psychology, where mental

<sup>abcd</sup>Authors'Contribution: a-Study design; b-Data collection; c-Statistical analysis; d-Manuscript preparation; e-Funds collection.

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toughness emerges as a key aspect that is often poorly understood and misinterpreted (Crust, 2007; YAZICI et al., 2022). Mental toughness is typically defined as a psychological edge that enables athletes to cope better than their rivals with the demands and pressures encountered in sport, including consistency under stress, unwavering commitment, and thriving on pressure (Cowden, 2017; Crust, 2007). Despite its importance, conceptual clarity remains elusive, with varying definitions leading to challenges in measurement and training.

An athlete's psychological makeup greatly impacts how well they perform, prompting coaches to incorporate psychological techniques into their training regimens (Reinebo et al., 2023; Swadana et al., 2025). Evidence from systematic reviews shows that interventions like psychological skills training, mindfulness-based approaches, and imagery can yield moderate improvements in athletic outcomes (Reinebo et al., 2023; Reyes-Bossio et al., 2022; Wang et al., 2025). A balance between both physical and psychological abilities is the prerequisite for effective athlete training programs. The most elite athletes have built their proficiency and prowess upon a foundation of mental toughness (Lan et al., 2025; Stamatis et al., 2020). Systematic reviews confirm that targeted interventions can cultivate mental toughness, with large effects observed in both observational and experimental studies (Fletcher & Sarkar, 2016). Even some of the most well-known youth sport organizations, such as national academies and Olympic development programs, have frequently and repeatedly emphasized the value and importance of developing mental toughness in their programs (Alvarez-Becerra et al., 2024; Şirin & Erdogan, 2025). It is crucial for athletes to perform better in sports, cope with stress, maintain a positive attitude, and, in addition, enhance communication skills, self-belief, emotional management, and resilience (Crust & Clough, 2011). These attributes not only boost individual performance but also foster team cohesion and long-term career sustainability. Furthermore, integrating mental toughness training with self-esteem enhancement—another pivotal psychological factor—can create a synergistic effect, as low self-esteem may undermine resilience while high self-esteem amplifies toughness. Bibliometric trends indicate a surge in research on these topics, underscoring their relevance for future sports science advancements.

## MATERIALS AND METHODS

### Data collection

The data were collected from 1991 to 2025 by using the Web of Science database. Sports mental toughness and sports self-esteem are the variables used for search engine. Several publications appeared on the screen, followed by extraction was done as a plain-text file in full record format. After extraction, the data were saved in a folder. The other data collected from topic searches were year-wise publications, publication types, and country/region-wise publications, and they were exported to Excel. The saved data were further used for data analysis.

### Data analysis

The extracted bibliographic data from Web of Science was visualized in the "VOSviewer" which is a freely available platform but it requires Java installation prior to download this tool. The extracted data was submitted to VOSviewer to make network visualization maps. For the network visualization map creation, keywords related to sports mental toughness and sports self-esteem were screened by taking the keywords that occurred a minimum of five times in a publication. The co-occurrences of keywords were searched in a full counting method. Then colourful network visualisation image was appeared on the screen and saved in the system. The bigger font size indicates more co-occurrences on that keyword. The connectedness between two keywords was represented by network. The bibliometric data for sports mental toughness and self-esteem was analysed on 17th April, 2025.

## RESULTS

### Research trends on sports mental toughness

Upon searching on the Web of Science, 526 results of sports mental toughness that are present globally appeared on the screen. This data search revealed that no Indian publications were present on sports mental toughness, clearly indicating the need for exploring the topic to enhance sports performance. Moreover, the extent of work published in the area of sports mental toughness is very limited and could be explored more globally and nationally. The exponential growth was found by searching the number of publications done over a period of time, i.e., the number of publications increasing with increasing time. Before 2015, very limited research was done on this particular topic. Nevertheless, after 2015 the number of publications increased drastically, as shown in Figure 1, indicating increasing interest in or requirement of conducting research in this particular area.

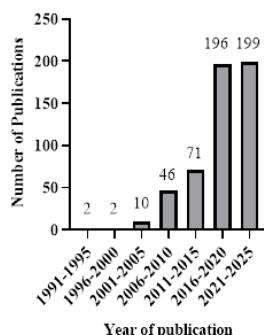


Figure 1. Number of publications on sports mental toughness over period of time

The exported data of publications types revealed that out of 526 publications, 85.93% publications are research articles and remaining

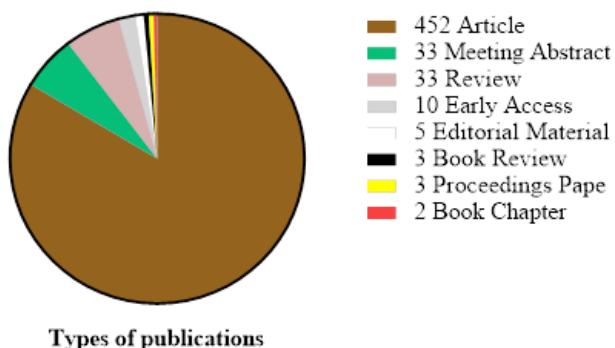


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14.06% publications falls under meeting abstract, review, early access, editorial material, book review, proceeding paper and book chapter as shown in the Figure 2.



Types of publications

Figure 1. Types of publication on sports mental toughness

The top 20 countries involved in sports mental toughness are given in the Figure 3. England is the top most country involved in sport mental toughness research followed by USA, Australia, China, and Canada.

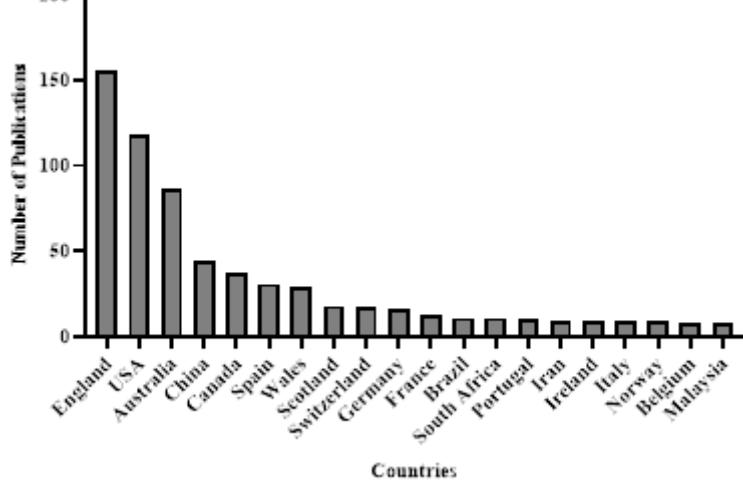


Figure 3. Top 20 countries involved in sports mental toughness research

The most cited top 5 publications (As per Web of Science) on sports mental toughness with their journal name and citation score are presented in the Table 1.

Table 1. Most Cited publications on Sports mental toughness as per Web of Science

SL No	Publication Name	Journal Name	Citations
1	Psychological Characteristics and Their Development in Olympic Champions	Journal of Applied Sport Psychology	613
2	What Is This Thing Called Mental Toughness? An Investigation of Elite Sport Performers	Journal of Applied Sport Psychology	389
3	Psychological Resilience in Sport Performers: A Review of Stressors and Protective Factors	Journal of Sports Sciences	328
4	A Framework of Mental Toughness in the World's Best Performers	The Sport Psychologist	248
5	The Concept of Mental Toughness: Tests of Dimensionality, Nomological Network, and Traitness	Journal of Personality	237

## VOSViewer data on Sports Mental Toughness

As shown in the Figure 4, the keywords related to sports mental toughness in different publications are personality, sports psychology, athlete, coping strategies, coping skills, self-efficacy, psychological skill, social support, health, toughness, motivation, mental health, goals, self-confidence, competition, talent identification, stress, anxiety, exercise, experience, well-being, emotional intelligence and many more.



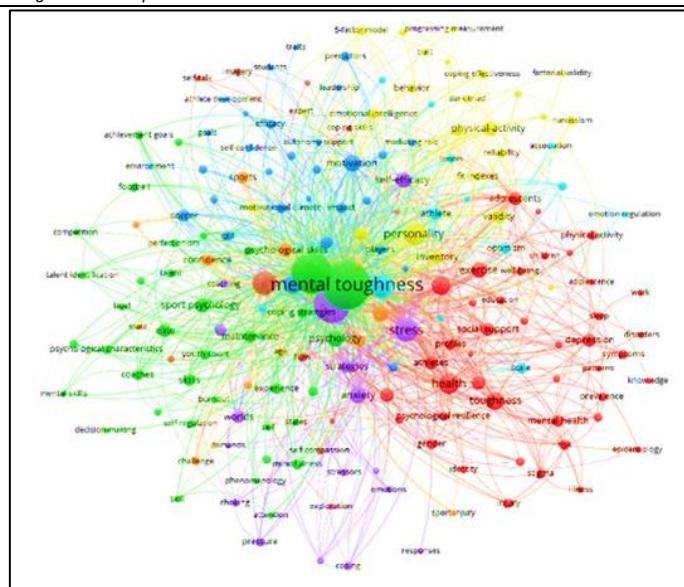


Figure 4. Global network visualization map on sports mental toughness research

### Research trends on Sports self-esteem

Upon searching on the Web of Sciences, total 2071 publications of sports self-esteem were found globally and the number of publications on sports self-esteem increased exponentially. Whereas, only 8 results were found nationally on sports self-esteem which clearly shows though globally sports self-esteem are trending, it is not explored in India. Hence, research on sports self-esteem need to be done for the upcoming generation.

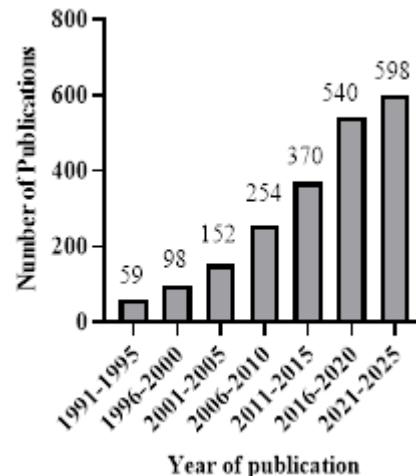


Figure 5. Number of publications on sports self-esteem over period of time

This study found that out of 2071 publications, 92.22% publications are research articles and remaining 7.77% publications falls under other types of publications as shown in the Figure 6.

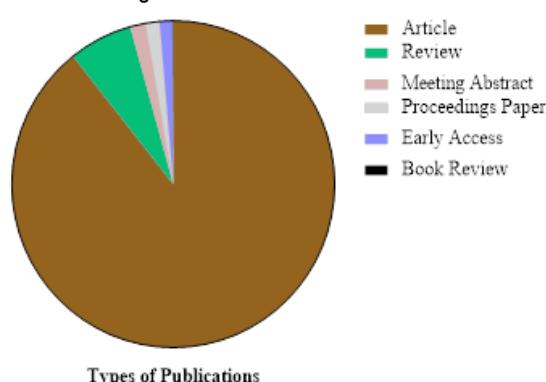


Figure 6. Types of publication on sports self-esteem

The top 20 countries involved in sports self-esteem are given in the Figure 7. USA is the top most country involved in sport self-esteem



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research followed by England, Japan, Canada, and Australia. India holds 49th position for publishing on Sports self-esteem. This research calls for exploring the sports self-esteem in order to enhance the sports performance and success in India.

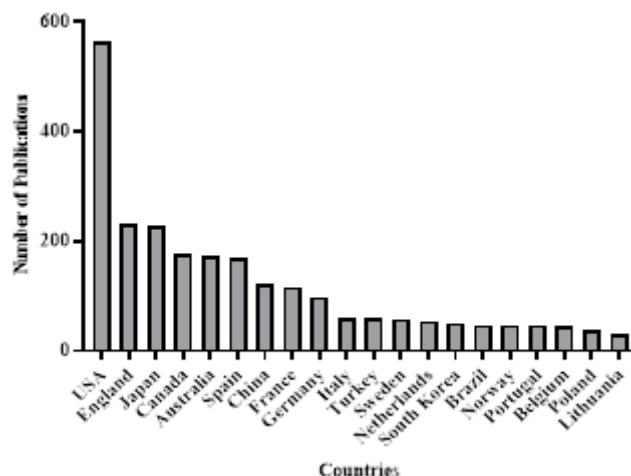


Figure 7. Top 20 countries involved in sports self-esteem research

The most cited top 5 publications (As per Web of Science) on sports self-esteem with their journal name and citation score are presented in the Table 2.

Table 2. Most Cited Publications on Sports Self-Esteem as per Web of Science

SL No	Publication Name	Journal Name	Citations
1	Physical activity and mental health in children and adolescents: a review of reviews	British Journal of Sports Medicine	1,479
2	A systematic review of the psychological and social benefits of participation in sport for children and adolescents: informing development of a conceptual model of health through sport	International Journal of Behavioural Nutrition and Physical Activity	1,395
3	Toward a psychology of positive youth development	American Psychologist	1,316
4	Reciprocal Effects of Self-Concept and Performance From a Multidimensional Perspective Beyond Seductive Pleasure and Unidimensional Perspectives	Perspectives on Psychological Science	867
5	The influence of physical activity on mental well-being	Public Health Nutrition	741

### VOSViewer result on Sports self-esteem

The national network visualization map for sports self-esteem presented in the Figure 8. As shown in the Figure 8, the keywords related to sports self-esteem in different publications are Covid-19, self-efficacy, gym, exercise, lockdown, adherence, music, gym workout, esteem, life, social support, athletes, body image, sedentary behaviour, school, enrolment, coaching, participation and few more.

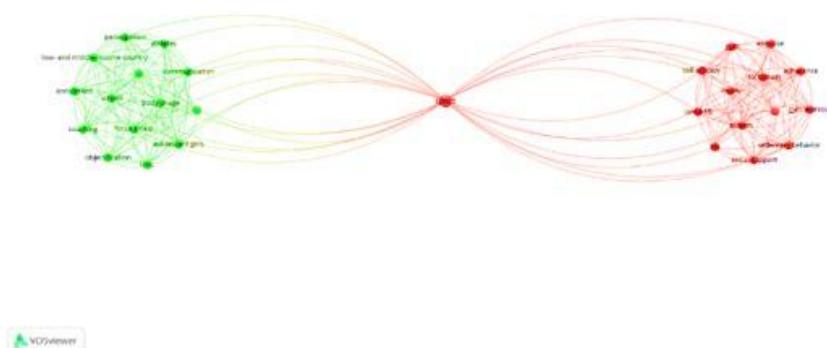


Figure 8. National network visualization map on sports self-esteem

The global network visualization map for sports self-esteem presented in the Figure 9; the keywords related to sports self-esteem in different publications are children, exercise, adolescents, esteem, health, personality, anxiety, gender, stress, obesity, perceptions, sports participation quality of life and many more.



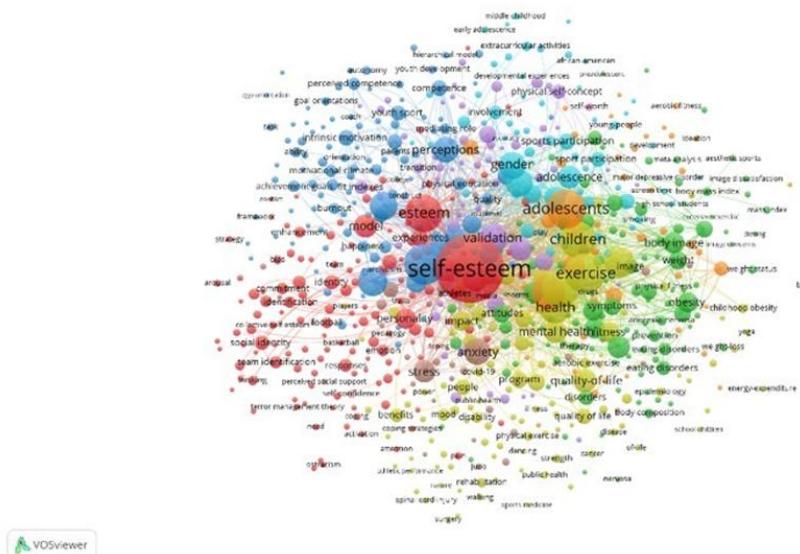


Figure 9. Global network visualization map on sports self-esteem

It is clear from the above bibliometric analysis on sports mental toughness and sports self esteem that there is a research gap on these two topics in India as compared to global scenario. Indian researchers should focus on these two critical psychological factors to improve the field of sports psychology as well as athletes well being.

## DISCUSSION

A comprehensive bibliometric analysis of sports mental toughness and sports self-esteem has revealed developing research trends globally, while simultaneously highlighting significant gaps in the national literature in India. This study, covering publications from 1991 to 2025, found that although there is an increase in the number of global publications for both topics, India's representation is very minimal. Specifically, 2071 global publications were found for sports self-esteem and 526 for sports mental toughness, but only 8 results nationally for sports self-esteem and none at all for sports mental toughness. This gap indicates the need for further exploration in India to understand how these psychological factors influence sports performance in the context of local culture and sports systems.

These findings have several important implications. First, mental toughness and self-esteem are widely recognized as vital psychological characteristics for athletes, contributing to improved performance, stress coping ability, maintaining a positive attitude, as well as strengthening communication, self-confidence, emotion management, and resilience (Bai et al., 2025; Yudho & Nugroho, 2021). The lack of local research means limited understanding of the application and development of these factors among Indian athletes. This limits the ability of coaches and sports psychologists in India to design effective, evidence-based interventions tailored to their athletes' specific needs.

Second, this research serves as an important guide for athletes, coaches, and sports psychologists. By highlighting major academic areas and emerging topics at the global level, the study can direct more informative and evidence-based practices and interventions. This includes a deeper understanding of specific contextual insights, reciprocal influences between mental toughness and self-esteem, and coach-athlete relationship dynamics (Stamatis et al., 2020; Zeiger & Zeiger, 2018).

Third, since a large percentage of youth are involved in the sports sector, this research has great potential to influence youth development and public health. With more focus on these crucial psychological factors, it can inspire young people to engage more in sports and promote a holistic and sustainable approach to athlete development (Ommundsen et al., 2024).

Finally, this analysis encourages greater collaboration across various disciplines and geographic regions. By facilitating the exchange of knowledge and best practices, the research community can become more global and inclusive, enabling India to learn from the experiences of other countries that have previously researched sports mental toughness and sports self-esteem (Singh et al., 2023).

In conclusion, although global trends show a significant increase in interest in sports mental toughness and sports self-esteem, there is an urgent need for Indian researchers to fill the national research gap. By conducting more studies in these areas, India can contribute substantially to the development of sports psychology and ultimately enhance the performance and well-being of its athletes on both national and international stages.

## CONCLUSION

For a better understanding of athlete performance in relation to mental toughness and self-esteem, more research should be done as the bibliometric data showed very little work has been done nationally. These two psychological factors are very important for improving sports performance and achieving success in national and international level. The results assist athletes, coaches, and sports psychologists by emphasizing key areas of academic and emerging subjects, which can guide evidence-based practices and interventions designed to enhance athletic performance and well-being. Moreover a large percentage of youth is involved in sports

sector therefore youth development and public health may upgrad or promote by this research. The research work also inspire to young people to engage in sports field for fostering holistic and sustainable approach for athlete development. Furthermore, this analysis encourages collaboration among various disciplines and geographic areas, thereby fostering a more global and inclusive research community.

## ACKNOWLEDGMENTS

The authors would like to express their sincere gratitude to the Web of Science database for providing the bibliometric data essential for this research. We also extend our appreciation to the developers of VOSviewer 1.6.20 for making the visualization tool freely available, which was instrumental in analyzing and presenting the data.

## CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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