

# A Bibliometric Analysis Of The Studies On Wrestling Sports

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## ABSTRACT

The aim of this study is to identify the trends and tendencies in the discipline in the last 34 years by bibliometrically analysing 806 studies and 319 reference sources published between 1990 and 2023 in the field of wrestling sports and competitions. In this context, a search was carried out in the "Web of Science Core Collection" Database under the title of "wrestling sports," and then bibliometric data of the studies was obtained. The studies were analysed in terms of the number of publications over the years, types of publications, country collaborations, and concept-subject orientations. Social network analysis was utilised to determine the co-author networks and concept-subject orientations. According to the results of the analysis, the number of publications was at the highest level between the years of 2011 and 2022. The highest number of publications was recorded in 2022, with 63 publications. The authors with the highest number of publications on wrestling sports and competitions are respectively Comstock RD (27), Kerry ZY (17), Collinc CL (12), and Kordi R (12). The most frequently used keywords in the publications related to the subject were humans, male, and wrestling. These words are used 640, 475, and 354 times accordingly. The journals in which the most studies were published are as follows: *Journal of Strength and Conditioning Research*, with a total of 42 articles; the *American Journal of Sports Medicine*, with a total of 36 articles; and *Journal of Athletic Training and Medicine and Science in Sports and Exercise* with 33 articles each. The USA has played a key role in country collaborations, with the highest number of collaborations being between the USA - Iran and Spain - Brazil, with 4 publications each.

**Keywords:** Wrestling, bibliometrics, sports.

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## I. INTRODUCTION

Wrestling has been practised in all Turkish tribes. In many provinces within the borders of the Ottoman Empire, wrestling tekkes (lodges) were established at that time. Wrestling has spread from big cities to the remotest villages in every period (Halıcı, 1980). Nowadays, traditional Turkish wrestling is performed in five types: karakucak wrestling, aba wrestling, oil wrestling, shalwar, and flag wrestling (Kahraman, 1989).

Wrestling has a great place in the history of Turkish culture (Özdamar, 1988). It is reported in Chinese Sources that around 200 B.C., wrestling was shown with the sign of "toslama (bumping)" and it was encountered in Yen-Çi city of Turkistan. It is also reported that in Kuçak City of Turkistan, bull, horse and camel wrestling was organised on the day when the new year started (Radloff, 1956). In his *Divan-ı Lügat-it Türk*, Kashgarlı Mahmut shows wrestling as the equivalent of the words "stumble" and "work" (Kaşgarlı, 1972).

Wrestling, which has deep roots in the history of Turkish culture and sports, is therefore characterised as an ancestral sport. Chinese Khan Age Sources (2nd century BC) also reveal that wrestling in the Turks was indicated by the sign of "bumping" (Eberhard, 1940). In Central Asia, where the history of Turkish culture was shaped, wrestling has always had an important place in traditional ceremonies (Tezcan and Boeschoten, 2001).

Since wrestling has a significant place in the history of Turkish culture, it has also entered the customs and traditions of the Turks. Furthermore, it is performed in different ways in various regions (Özdamar, 1988). In addition to being a sport for Turks, wrestling was also seen as a cultural symbol by being organised in weddings and national ceremonies (Dervişoğlu, 2012). Consequently, wrestling has embraced different forms, such as oily, aba and shalwar wrestling, that emerged with the historical process (Yıldıran, 2000). In Turkey, wrestling sports, in which approximately 200 official and dozens of unofficial competitions are held annually, ranks first in this respect (Türkmen, 2017).

Wrestling is a sport that gives excitement to the spectators at every moment of its course due to the fact that both defense and offense systems are intertwined, the games are applied in a very short time, the duration of the encounter is short, the struggle is in close contact, and the continuously renewed rules make the wrestlers more active (Akğün, 1992; Johson and Cisar, 1987; Macdougall et al., 1984).

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As in many subjects, there are studies on bibliometrics methods in sports fields such as wrestling (Çelik, 2023a; Çelik, 2023b).

The aim of this study is to evaluate the development of the studies published on wrestling sports according to years, journals, authors, and subjects by bibliometric analysis.

## II. MATERIALS AND METHOD

The data presented in this study consist of 806 studies on wrestling sports that were published between 1990 and 2023 and scanned in the database of the "Web of Science." The database of the Web of Science (WOS) provides access to citation statistics of scientific publications and bibliographic data of publications (Meho and Yang, 2007). In the "Web of Science Core Collection" Database, the publication types, titles, author names, author countries, number of citations, number of citations and sources of 806 studies published in the field of the "sport of wrestling" in the database of "Web of Science" were accessed. Social network analysis related to wrestling sport was conducted with common citation networks. This analysis was carried out by uploading the data to the R Programme in the appropriate format.

The term "bibliometrics" was first introduced by Alan Pritchard in 1969. Pritchard defines bibliometrics as the application of mathematical and statistical methods to analyse written communication in order to guide the processes of this communication and the development of a discipline (Lawani, 1981). Pioneering bibliometric studies date back much further, to the early 1900s. In 1917, Cole and Eales were among the first researchers to review the studies published between 1550 and 1860 on the history of comparative anatomy and to reveal the current development of research areas by bibliometric analysis (Okubo, 1997).

In terms of the development process, the studies that would constitute the basis of bibliometrics in the early days were followed by the creation of bibliometric laws, databases, and package programs (Şimşir, 2021).

The concept of bibliometrics is defined as the analysis of scientific information-sharing tools such as published books, journals, and articles by mathematical and statistical methods (Pritchard, 1969; Evren and Kozak, 2012). On the other hand, bibliometric analysis is the quantitative analysis of certain characteristics of documents or publications, such as the number of authors, the journal in which they are published, the subject, and publication information (Al and Tonta, 2004; Yalçın, 2010). Bibliometric research is based on analysing particular characteristics of documents or publications and obtaining various findings on scientific communication (Al and Coştur, 2007).

The aim of bibliometrics is to compile studies published in any research area and to study or analyse the research area through scientific publications stored or indexed in large bibliographic databases using a range of methods (van Raan, 2005). In short, it contributes to the determination of the most reliable scientific sources, the evaluation of new developments, the discovery of scientific developments, the discovery of knowledge in different ways, and the advancement of science (Martinez et al., 2015). In today's world, bibliometric methods are increasingly used in various disciplines in order to reveal general trends related to a particular research topic or discipline/field and to map the collaboration between scientific studies (Börner et al., 2003; Župič and Čater, 2015).

## III. RESULTS AND DISCUSSION

The basic information obtained in the field of wrestling sports is given in Table 1.

**Table 1.** Basic Information about Publications

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	1990:2023
Sources (Journals, Books, etc.)	319
Documents	806
Annual Growth Rate %	1,11
Document Average Age	11,5
Average citations per doc	0
References	1
DOCUMENT CONTENTS	
Keywords Plus (ID)	1236
Author's Keywords (DE)	995

AUTHORS	
Authors	2940
Authors of single-authored docs	49
AUTHORS COLLABORATION	
Single-authored docs	54
Co-Authors per Doc	4,53
International co-authorships %	0
DOCUMENT TYPES	
Biography	1
Case reports	60
Clinical study	1
Clinical trial	12
Clinical trial, phase ii	1
Comparative study	48
Controlled clinical trial	1
Evaluation study	1
Historical article	5
Journal article	670
Review	3
Systematic review	3

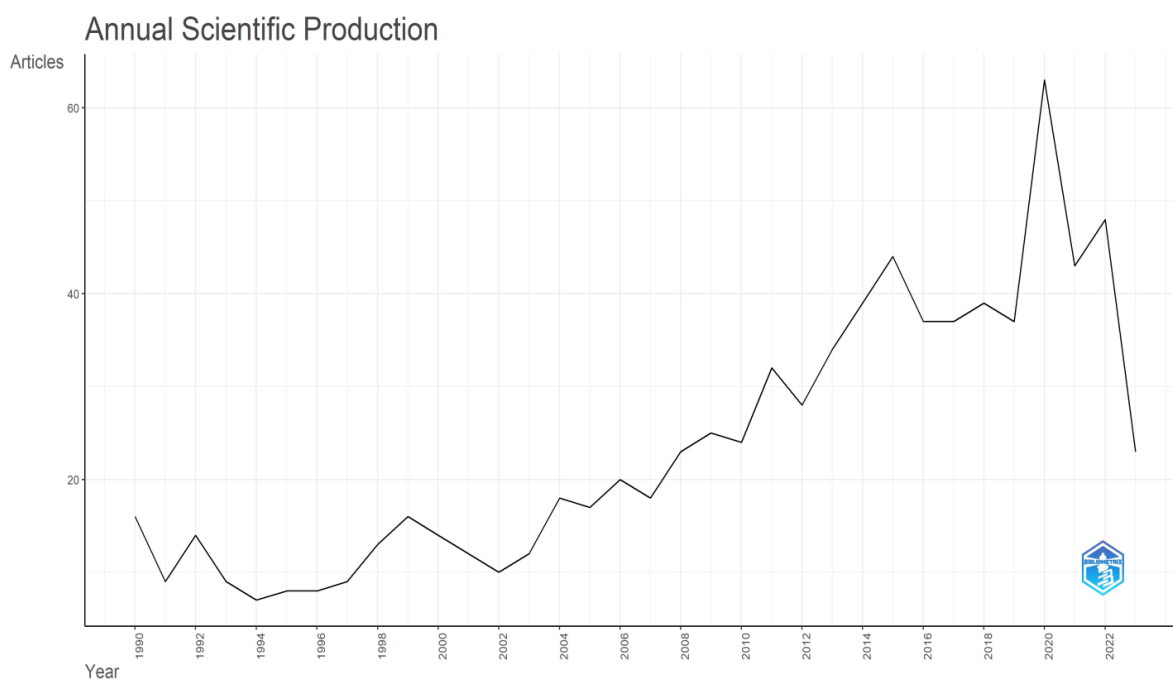
As seen in Table 1, a total of 806 works have been published on this subject, of which 670 are articles, and the rest are reviews, papers, clinical studies, case reports, etc. The distribution of the number of publications by years is presented in Table 2 and Figure 1.

**Table 2.** Distribution of Publications by Years

Year	Articles
1990	16
1991	9
1992	14
1993	9
1994	7
1995	8
1996	8
1997	9
1998	13
1999	16
2000	14
2001	12
2002	10
2003	12
2004	18
2005	17
2006	20

2007	18
2008	23
2009	25
2010	24
2011	32
2012	28
2013	34
2014	39
2015	44
2016	37
2017	37
2018	39
2019	37
2020	63
2021	43
2022	48
2023	23

When Table 2 and Figure 1 are analysed, the highest number of publications were recorded in 2020, 2022, and 2015, respectively. The number of articles belonging to these years are 63, 48, and 44, respectively.



**Figure 1.** Number of Publications by Years

The list of journals in which studies directly related to the subject are published is shown in Table 3 and Figure 2. The journal with the highest number of articles published in the field of wrestling sports is the Journal of Strength and Conditioning Research, with a total of 42 articles. This is followed by The American Journal of Sports Medicine, with a total of 36 articles, and The Journal of Athletic Training and Medicine and Science in Sports and Exercise, with a total of 33 articles.

**Table 3.** Number of Relevant Publications with the Highest Source Impact Values

Sources	Articles
Journal of Strength and Conditioning Research	42
The American Journal of Sports Medicine	36
Journal of Athletic Training	33
Medicine and Science in Sports and Exercise	33
The Journal of Sports Medicine and Physical Fitness	22
Clinical Journal of Sport Medicine: Official Journal of the Canadian Academy of Sport Medicine	21
British Journal of Sports Medicine	19
Orthopaedic Journal of Sports Medicine	18
The Physician and Sports Medicine	15
Sports Health	14

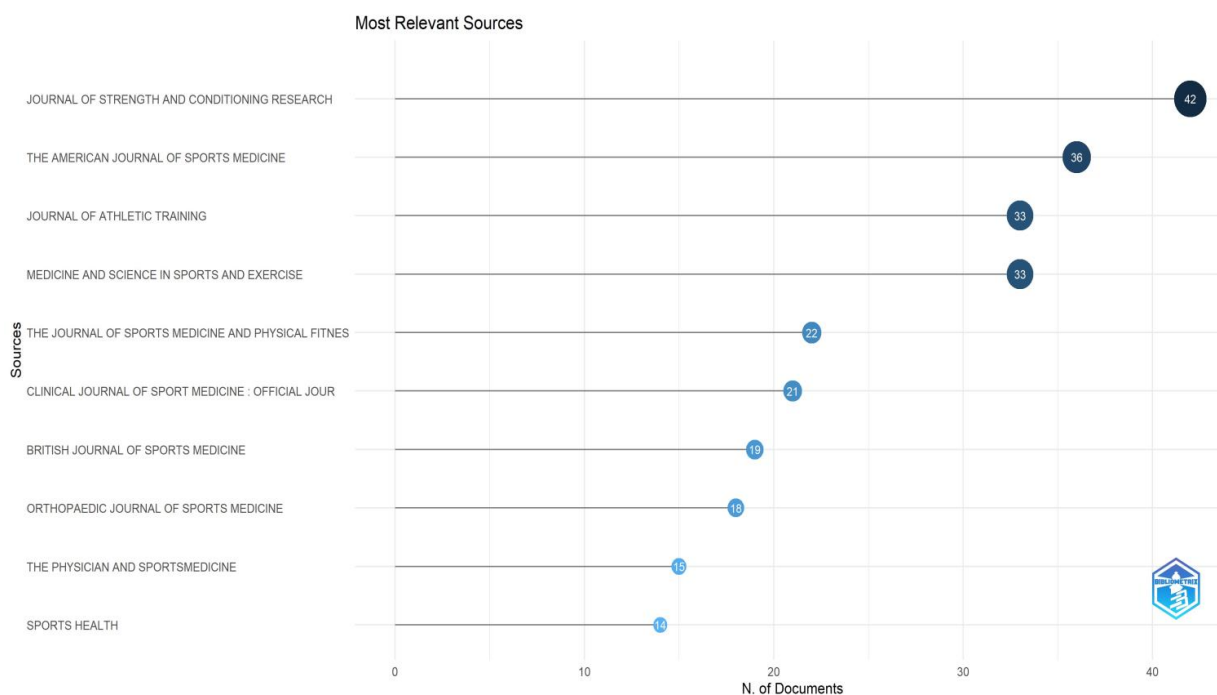


Figure 2. Publications with the Most Relevant References

The number of publications of the authors during the relevant period is given in Table 4. Comstock RD is the author with the most publications on wrestling matches, with a total of 27 articles. Comstock RD was followed by Kerry ZY with a total of 17 articles, and Collins CL and Kordi R with 12 articles each. These publications are covering the period from 1990 to 2023. Moreover, there have been more extensive publications recorded in the period from 2007 to 2022. Such information can be seen more clearly in Figure 3.

**Table 4.** Authors with the Most Publications

Authors	Articles	Articles Fractionalized
Comstock RD	27	6,76
Kerr ZY	17	3,14
Collins CL	12	2,78
Kordi R	12	2,57
Anderson BJ	10	7,03
Fields SK	10	2,25

Owens BD	9	1,90
Yard EE	9	2,82
Dompier TP	8	1,31
Housh TJ	8	1,43

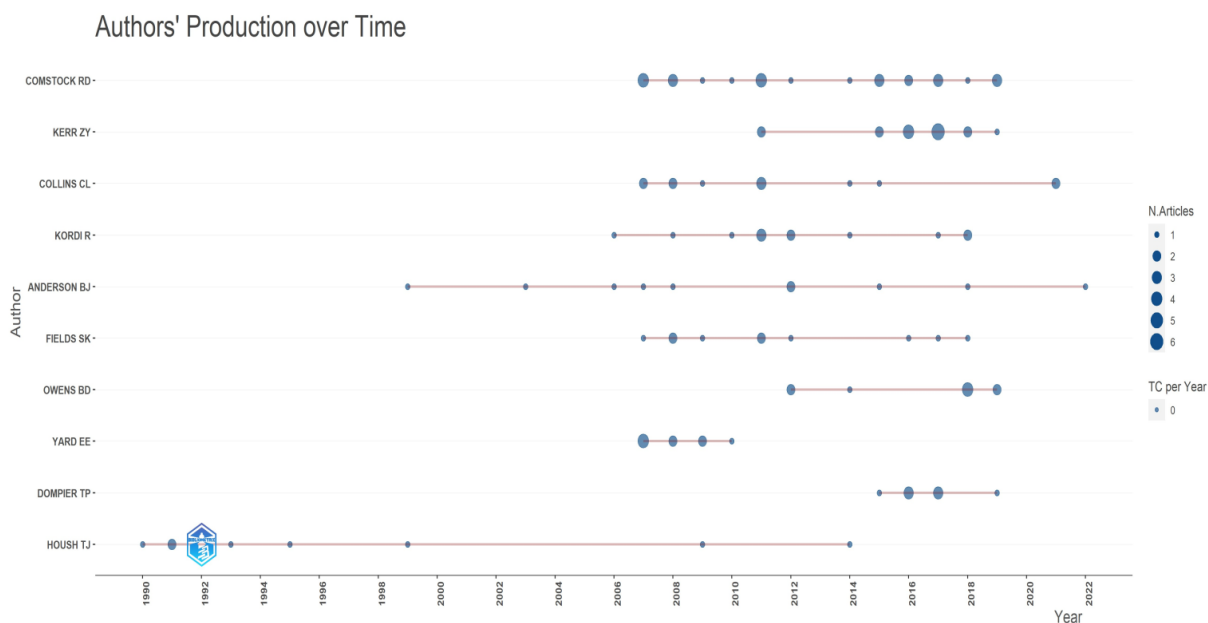


Figure 3. Authors' production over time

As a result of the Web of Science-based search, the most frequently used keywords in the journals included in the SCI-Exp. Indexes are presented in Table 5 and Figure 4. The most frequently used words are humans (640 times), male (475 times), and wrestling (354 times).

**Table 5.** Most Frequent Words

Words	Occurrences
Humans	640
Male	475
Wrestling	354
Adolescent	322
Adult	238
Female	235
Athletic injuries	186
Athletes	160
Young adult	146
Sports	121

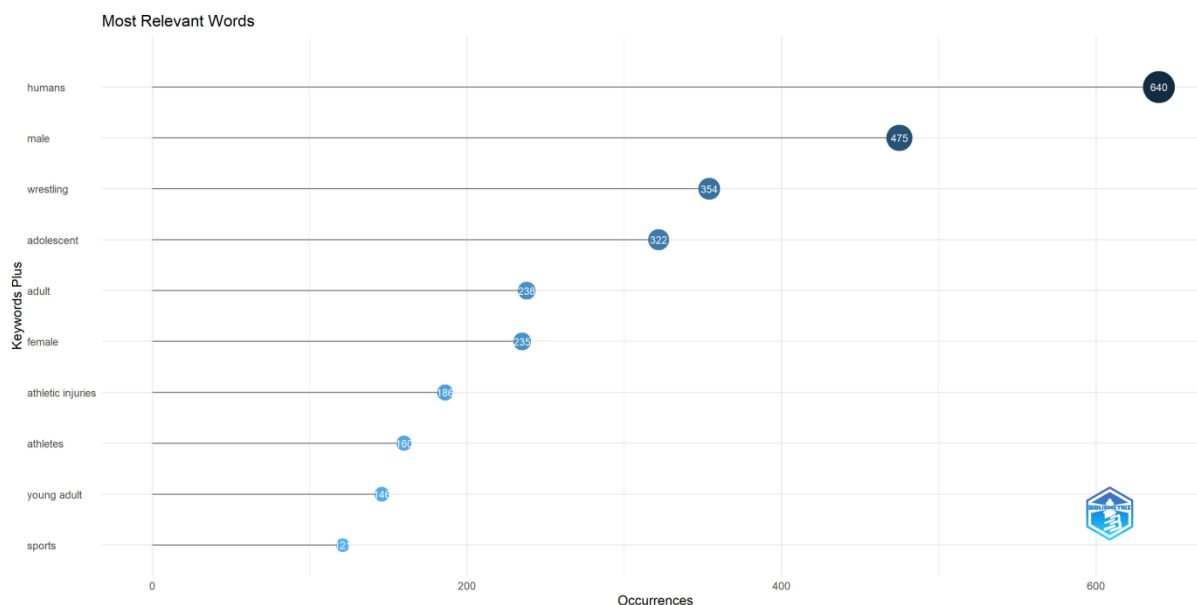


Figure 4. Most relevant words

Word cloud analysis was conducted for the most used keywords, and the results of its analysis are presented in Figure 5. It was observed that most of the words were specific to the related field. The most commonly used keyword was "humans". "Male" was the second most commonly used keyword. These most used words were followed by wrestling, adolescent, and adult.

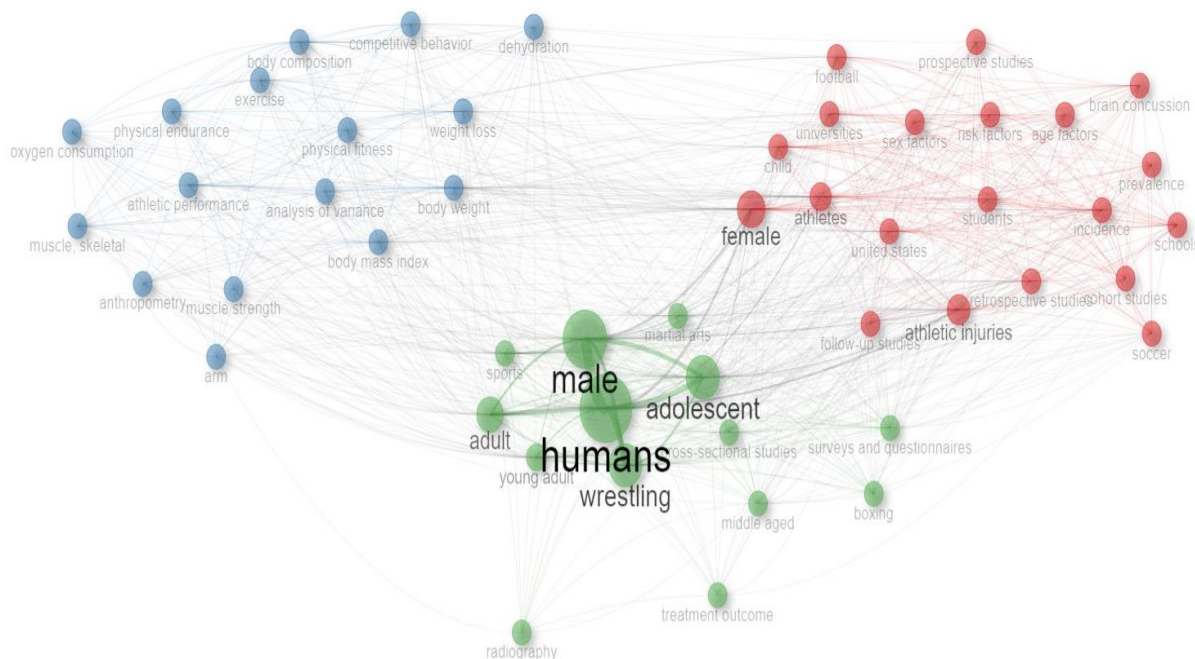


Figure 5. Word Cloud

The collaboration map between the words used in published studies is presented in Figure 6. Collaboration networks offer associative relationships between keywords through a social network of words in common with each other. When collaboration networks are analysed according to keywords, the word x word adjacency matrix is used in the collaboration network, which is basically determined according to the frequency of words used together. When the network structure was analysed, 3 different clusters were formed. In the clusters, the words represented the nodes, and the thickness of the links between the words indicated the frequency of collaboration. Moreover, the growth of the nodes revealed the effect of the words in the network. When the clusters in the figure are analysed, humans have come to the forefront in the green cluster. Words in collaboration with the word humans are male, wrestling, adolescent, adult, and young adult. In the red cluster,

the word female came to the fore. The words female, athletic injuries, and athletes were closely associated with it.

The words arm, anthropometry, muscle strength, muscle-skeletal, athletic performance, analysis of variance, body weight, body mass index, weight loss, and dehydration in the blue cluster were in collaboration with each other.



**Figure 6.** Collaboration occurrence network (keywords)

The representation of subject densities is presented in Figure 7. The most intensively studied topics were in the green-colored cluster, and these topics were on humans, males and wrestling. This was followed by females, athletic injuries, athletes and the United States in the red cluster. Children, universities, sex factors and soccer are other topics. Arm, muscle strength, body mass index and body weight in the blue cluster have also been the most studied topics. Information on thematic map clusters related to this is given in Table 6.



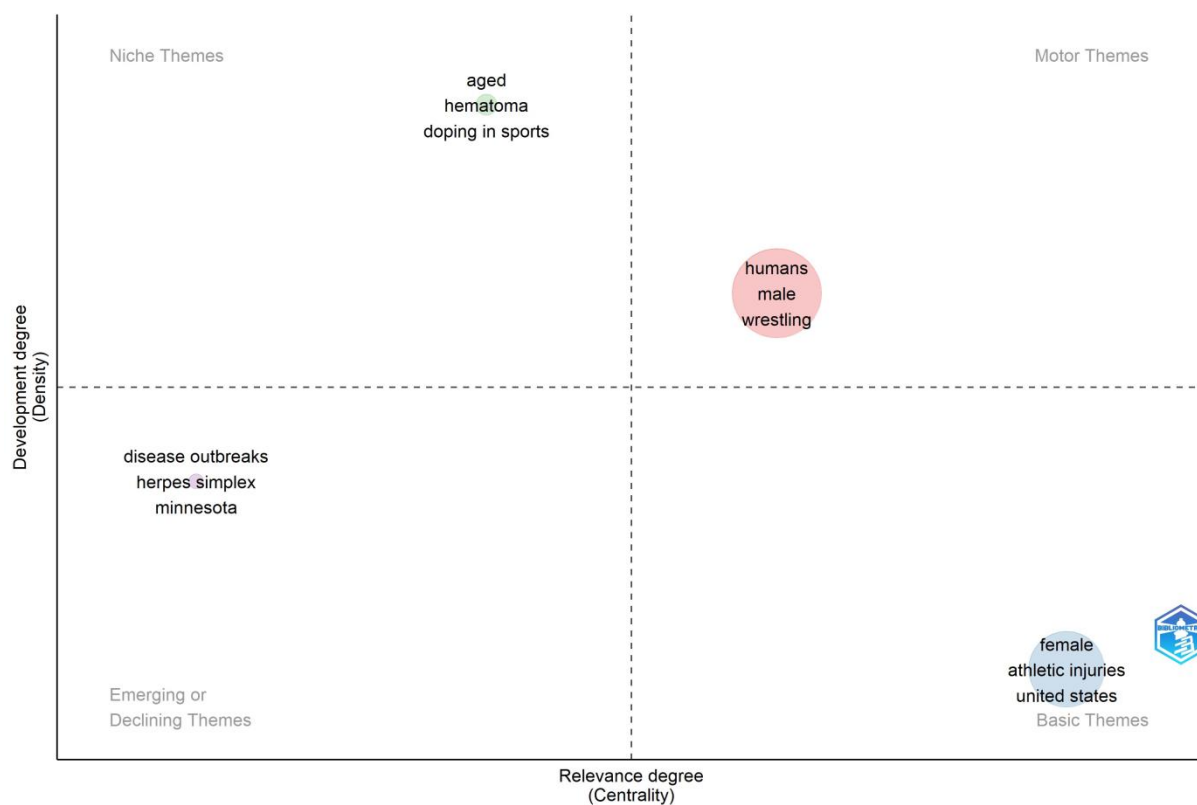


Figure 7. Thematic Map

Table 6. Thematic map clusters

Cluster	Callon Centrality	Callon Density	Rank Centrality	Rank Density	Cluster Frequency
Humans	5.750723142	30.02441903	3	3	3936
Female	7.172289364	27.00422034	4	1	1853
Aged	0.874580499	35.92577031	2	4	91
Disease outbreaks	0.615811012	27.35890653	1	2	66

Trend themes analysis allows us to see how keywords, titles, and abstracts have changed over time, becoming driving elements in the expansion of research in any sector (Figure 8). Trend topics analysis assigns logarithmic frequency values to terms in a coordinate plane to track changes.

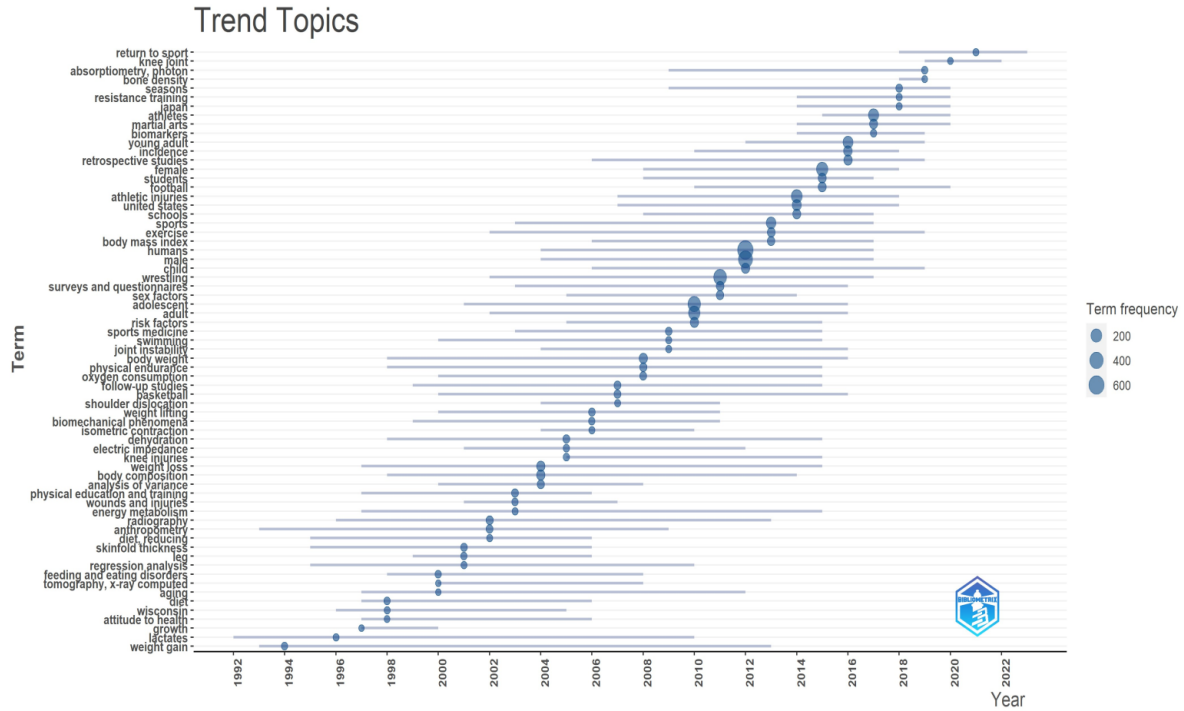


Figure 8. Trend topics of the field

The trends of wrestling sport topic studies were investigated using Figure 8, which was created to show the information such as abstract, keyword, and title of the three keywords that were cited at least three times each year between 2010 and 2020. In the research conducted in recent years, keywords have been regularly included. Humans, male, child, wrestling, survey and questionnaires, sex factors, adolescent and adult retained their attractiveness.

#### IV. CONCLUSION

In this study, a bibliometric analysis was conducted in order to provide a wide range of research on past and current research trends in wrestling sports. The thematic trend and potential areas of interest were obtained by examining 806 articles from the scientific database of "Web of Science", analysing the most influential authors and research topics. The results demonstrated the growing interest in this area of research (overall in the last 10 years). Comstock RD, Kerr ZY, Collins CL, and Kordi R are the most prolific authors in this field. Journal of Strength and Conditioning Research has supported studies on wrestling sports for many years. The fact that this Journal has the highest number of publications with the words "wrestling sports" included in the subject title until 2023 (n=42) is an indicator of this.

The most common research topics are humans, male and child. In accordance with this information, the widespread use of bibliometric analysis studies can make a significant contribution as a guide to studies in the sports field.

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