Nazarbayev University School of Medicine

Sports Injury Prevention and Rehabilitation: A Bibliometric Mapping of the Research Literature

Marat Urazayev

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Abstract

Introduction: In the realm of sport, injuries cause an inherent risk with serious public health implications, including disability, missed sporting events and significant financial burden. This need is emphasized by the global drive to improve sporting performance while managing the rising costs of treatment and rehabilitation. In this paper, bibliometric analysis aimed to examine historical trends and inform future strategies in the field of sports injury prevention and rehabilitation.

Methods and Analysis: The bibliometric method was applied using the Scopus database. Metadata were stored in two separate files titled "Sports Injury Prevention" and "Sports Injury Rehabilitation". The study period was from 1949 to 2022. Analysis and bibliometric mapping was performed in Biblioshiny app.

Results: A total of 8,242 articles were retrieved, of which 5,269 (63.9%) focused on injury prevention in athletes and 2,973 (36.1%) focused on sports rehabilitation. Among the top ten articles on injury prevention, the most cited article was Hewett's article, which was cited 2,365 times. The most cited article on rehabilitation was the Shelbourne & Nitz article with 971 citations. A total of 5,269 articles were published in 893 journals related to sports injury prevention. In rehabilitation, 2,973 articles were distributed among 618 journals. A total of 14,752 individual authors in the field of sports injury prevention and 9,470 authors in the field of sports injury rehabilitation produced 5,269 and 2,973 publications, respectively. A total of 3,566 institutions participated in the study. The majority of articles were produced by the University of Calgary (Canada) with 301 articles in the prevention category and the University of Delaware (USA) with 108 articles in the rehabilitation group. The term "soccer" was the most frequently used keyword in the context of injury prevention, occurring 240 times, while "knee" was the dominant keyword in rehabilitation.

Conclusion: The United States has been a leader in sports injury prevention research, with the University of Delaware, University of La Trobe, and University of Kentucky leading the way in rehabilitation research. Key researchers such as Finch and Snyder-Mackler have made significant contributions to these fields, especially in the study of ACL injuries and concussions. The differences in research focus across sports highlight the need for more attention to prevention strategies in baseball and ankle injuries, and point to opportunities for future research and development in these areas.

Acknowledgment: I express my heartfelt gratitude to my supportive supervisor, Dr. Matthew Courtney, whose insightful feedback and guidance propelled my work beyond my expectations from the project proposal to the thesis defense.

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TABLE OF CONTENTS

1. Introduction

In the field of sports, the possibility of getting injured is a natural part of the game. At the same time, injuries, especially serious ones, are acknowledged as an important concern for public health. Such injuries not only result in pain and physical limitations but also lead to unintended absence from sporting and related physical activities. Moreover, it is also important to consider the substantial financial burden associated with the necessary medical and rehabilitative procedures (Cumps et al, 2008).

The physical and financial consequences of injuries highlight the need for effective ways to prevent injuries in both young people and more mature participants (Eliakim et al, 2020; Walia & Boudreaux, 2021). Most injuries in sports, more than 60%, occur to the lower parts of the body, and out of these, 60% are injuries to the ankle and knee joints (Emery & Tyreman, 2009). Therefore, any minimization in the prevalence of sports injuries is important for sustaining a healthy *mobile* population.

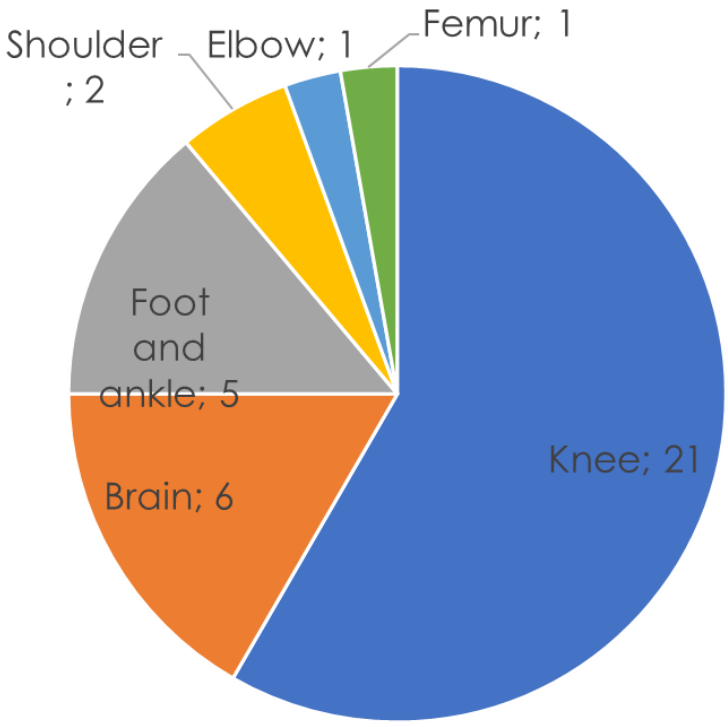
Consequently, it is crucial to prioritize injury prevention as a means to reducing the chances of athletes getting hurt and to minimize the financial burdens placed on sports teams and society as a whole. The constant drive for improved elite-level sporting performances and the associated increased expenses of medical interventions and rehabilitation have triggered a worldwide push to discover novel and effective methods to minimize the occurrence of sports injuries and promote speedy and efficient return to activity.

One approach for analyzing past and current trends in the field of sports injury prevention and rehabilitation is bibliometric analyses. Bibliometric studies involve statistically evaluating published research to measure its impact and analyze publication trends, particularly focusing on work with significant citation rates (Donthu et al, 2021). By providing insight into how historical context and nosology influence the conceptualization of sports injuries, this approach can provide insights for guiding future prevention, treatment, and regulatory policies.

To date, most existing bibliometric studies related to sport science (based on the Web of Science and Scopus databases) explore specific sport-associated injuries and their treatment (see Appendix 1 for full list). An examination of the anatomical focus of these studies provides insight into how bibliometric methodologies have been employed in the field. Figure 1 provides a summary of the frequency with which those studies are devoted to specific anatomical regions. We can see that the knee has been a popular focal area for such researchers.

Figure 1

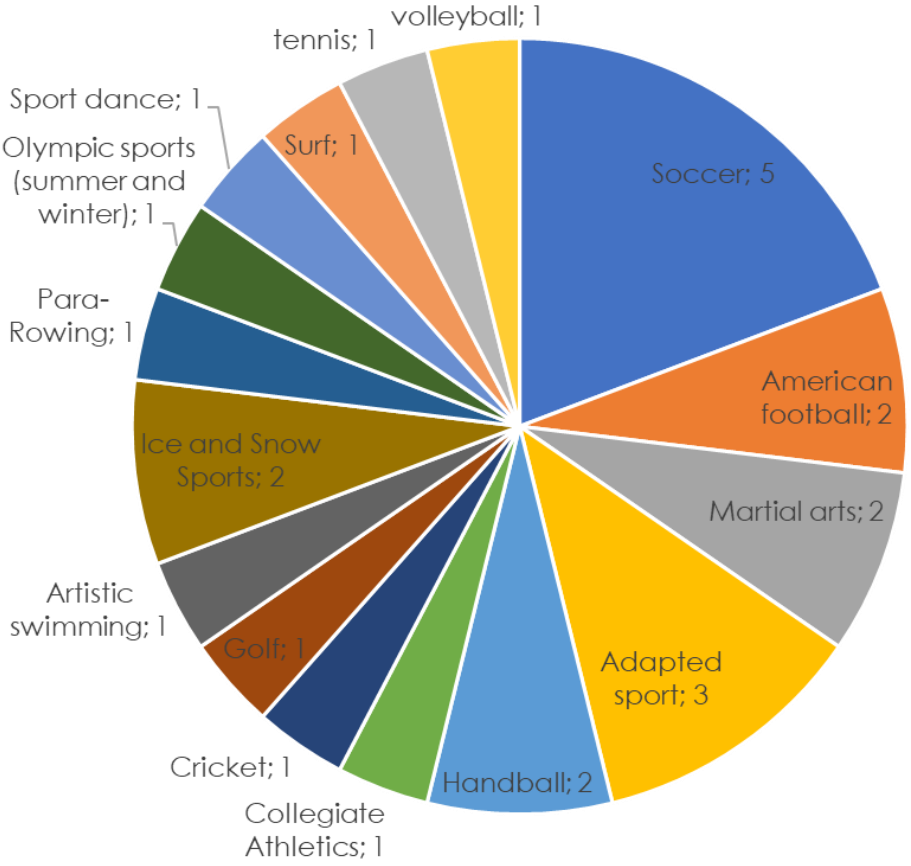
Frequency of Bibliometric Research Articles Associated with Specific Anatomical Regions



Furthemore, among the bibliometric studies that focus on specific kinds of sports, the most popular sport is soccer (Figure 2).

Figure 2

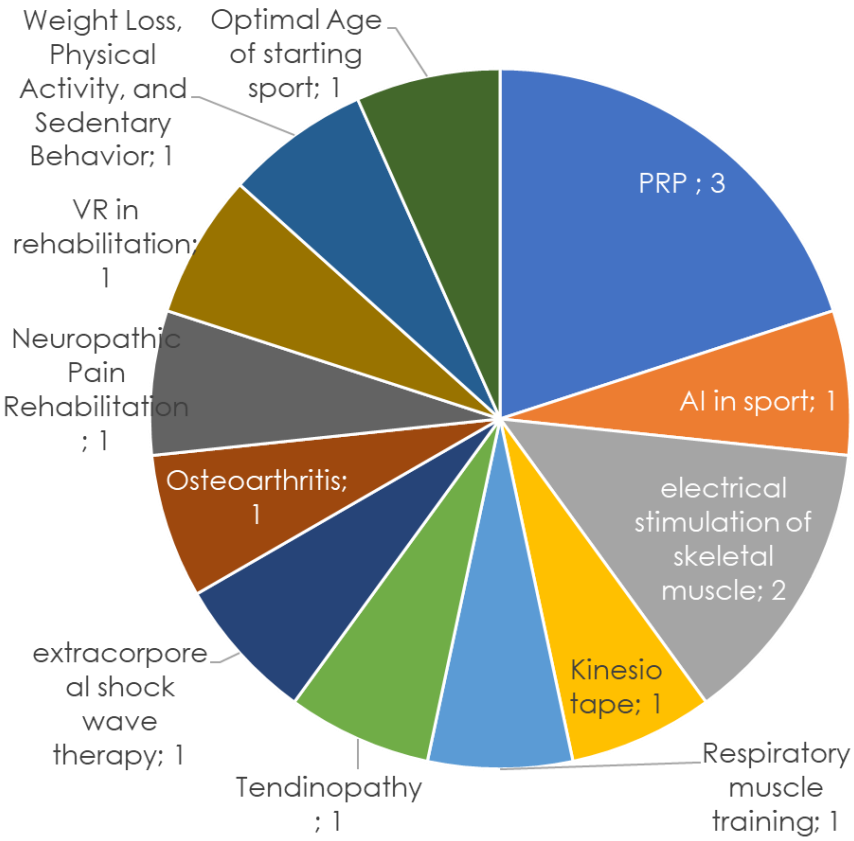
Frequency of Bibliometric Research Articles Associated with Specific Sports



In terms of specific forms of interventions, bibliometric studies have most often focused on the application of platelet-rich plasma treatment (Figure 3).

Figure 3

Frequency of Bibliometric Research Articles Associated with Specific Interventions



Note. PRP = platelet-rich plasma treatment; AI = artificial intelligence; VR = virtual reality.

While bibliometric studies in the field have focused on anatomical regions, specific sports, and type of intervention, there exists a lack of studies devoted to the entire field of sport science. However, one such example is by, Gholampour et al. (2022) who conducted an analysis of highly cited papers in the entire discipline of sport science published in the Web of Science database between 2010 and 2020. In another bibliometric study, Ramezanghorbani and Rangraz (2022) investigated sports medicine research in the Scopus database spanning from 2011 to 2020. However, as far as this author is aware, no such bibliometric-based research has been published in the field of *sports injury prevention and rehabilitation* up to the present time.

Given the dearth of such research in the field, the following research questions and related objectives in the current study are:

RQ1: To (a) visualize the growth and trajectory of published journal articles in the fields of (i) injury prevention and (ii) injury rehabilitation, and (b) identify the most prominent research papers in the respective fields.

RQ2: To determine who the most prolific researchers and countries are when it comes to the topic of (a) sports injury prevention, (b) and rehabilitation.

RQ3: To understand the prominent patterns of scientific collaboration between scientists and countries for (a) sports injury prevention, and (b) rehabilitation?

RQ4: To map the most popular topics and history of development of the two fields by tracking how they developed and evolved from their inception to today.

2. Methodology

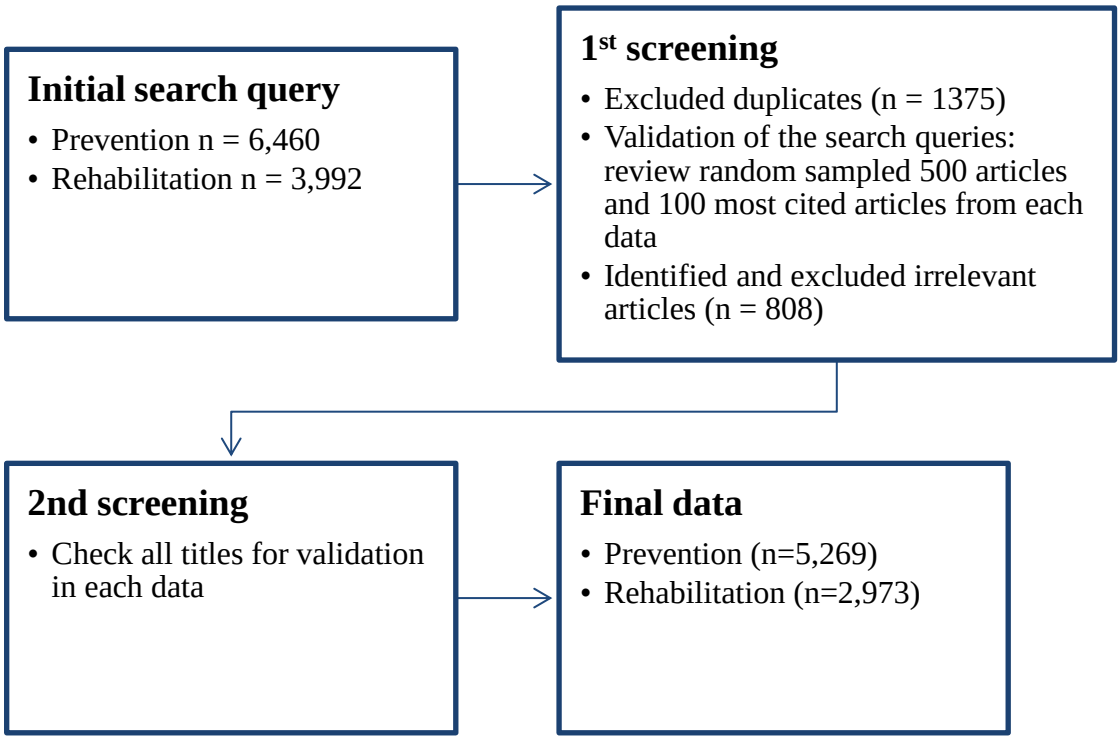
2.1 Source of Bibliometric Data and Search Strategy

To collate the bibliometric data, we accessed meta-data of published research from the highly regarded international bibliometric database, Scopus (Elsevier, Amsterdam, Netherlands). The Scopus databased was chosen because it outstrips Web of Science in terms of size, boasting over 23,000 indexed journals spanning various scientific disciplines (Falagas et al, 2008). A noteworthy feature of Scopus is its complete integration with Medline, setting it apart as a superior option to Medline alone. Additionally, exporting data from Scopus to other databases is a seamless process. Scopus provides users with two distinct search methods: a basic search and an advanced search, enabling the execution of complex and lengthy queries with a high degree of validity. Specifically, the Scopus platform allows searches based on terms found in titles, titles/abstracts, journal names, author names, or affiliations (Pranckutė, 2021).

For the current study, we constructed comprehensive search queries aiming to capture all of the relevant documents spanning the topics of both sports injury prevention and sports injury rehabilitation, respectively. The queries were designed to be extensive and comprehensive in their capacity to retrieve pertinent metadata (Figure 4).

Figure 4

Flow Chart of Search Query Procedure



Given the dualistic nature of the study, the following two search queries were adopted for this study:

1.TITLE-ABS-KEY (sport AND injury AND prevention) OR TITLE-ABS-KEY (athlete AND injury AND prevention) OR TITLE-ABS-KEY (athlete AND injury AND rehabilitation) AND NOT TITLE-ABS-KEY surgical OR non-traumatic OR reoperation).

2.TITLE-ABS-KEY (sport AND injury AND rehabilitation) OR TITLE-ABS-KEY (athlete AND injury AND rehabilitation) AND NOT TITLE-ABS-KEY (surgical OR non-traumatic OR reoperation).

The search queries were conducted on October 26, 2023. Only fully published articles in English from journals related to sports or medicine were included in the bibliometric analysis, based on the additional Scopus field label LIMIT-TO (PUBSTAGE, "final"). As illustrated in Figure 4, the initial queries resulted in 6,460 and 3,992 records of journal articles on the respective topics. Details as to the validation step of the final data (see Figure 3) is describe in detail in sub-section 2.2 below.

The resultant metadata were stored in two separate files named “Sports Injury Prevention” and “Sports Injury Rehabilitation”. Three independent reviewers reviewed the evaluated all identified duplicates and removed them from each of the primary datasets.

2.2 Validation

Two distinct approaches were employed to validate the results of the search queries. The initial approach involved scrutinizing the top 100 cited documents to ensure alignment with the scope of sports injury prevention or rehabilitation. This step aimed to eliminate false-positive results by excluding documents exploring interventions in other non-sports related fields (such as surgery, pharmacology, supplementation), non-traumatic diseases, and those involving non-athlete participants or animal studies. The second approach entailed a review of 500 randomly sampled articles, assessed through titles and abstracts. The random sampling was executed with the assistance of the open-source R programming language, R (R Core Team, 2023), via the following code to select the rows of interest:

```
set.seed(123)

sort(sample(1:8132, 500))
```

2.3 Bibliometric Indicators and Analysis

After completing data validation, bibliometric analysis was conducted by exporting data from the retrieved literature to the Bibtex file format. The exported data encompassed citation information, bibliographical details, abstracts and keywords, as well as references. Additionally, the literature was exported to the Biblioshiny app (Aria & Cuccurullo, 2017), which was installed and launched locally through RStudio for analysis and visualization, e.g., the creation of network visualization maps.

3. Results

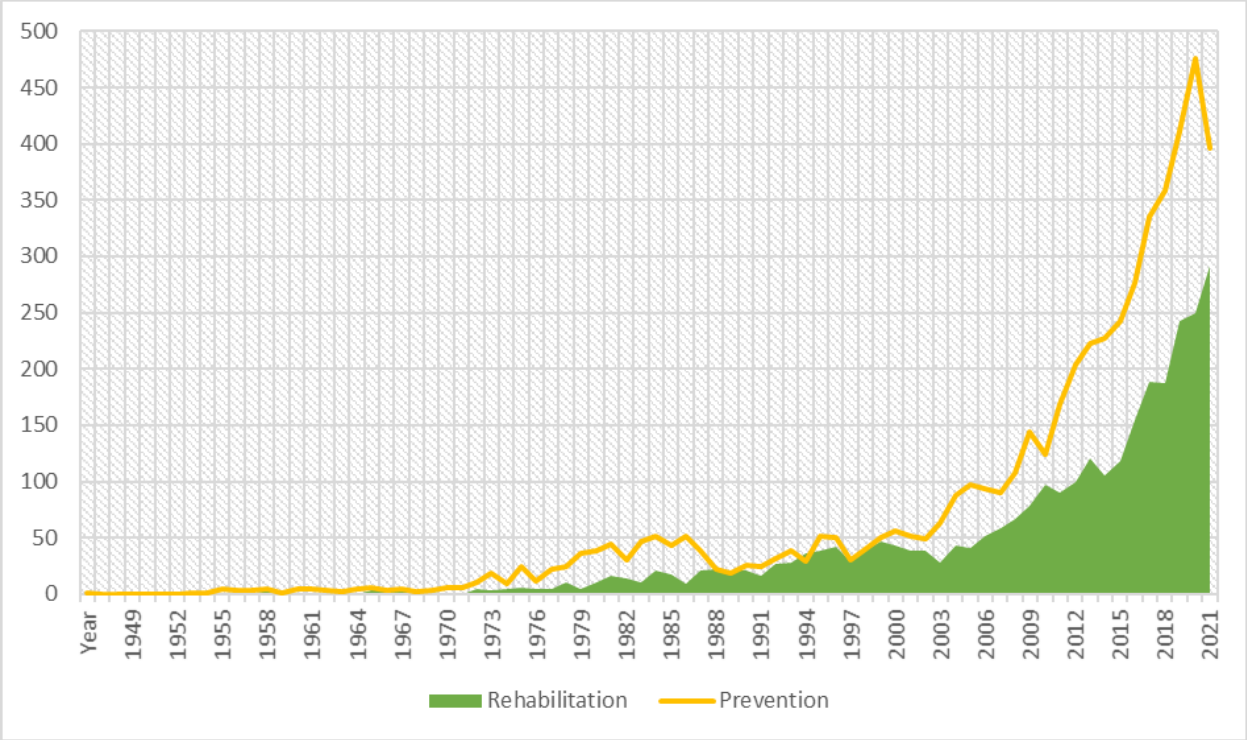
Results are arranged in order of research questions. Therefore, the first focal area presented pertains to the growth and trajectory of research papers in (a) sports injury prevention, and (b) sports injury rehabilitation.

3.1 RQ1(a, b): Growth and Trajectory of Research Papers

Figure 5 illustrates the growth and trajectory of research papers in the respective fields of injury prevention and rehabilitation (1947-2022).

Figure 5

Frequency of Journal Articles Produced in the Fields of Sports Injury Prevention and Rehabilitation (1947–2022)



Note that the orange line illustrates the yearly increase in documents in the injury prevention related literature, while the green line depicts the annual growth of documents in the rehabilitation-related literature.

A total of 8,242 articles were identified, with 5,269 (63.9%) focusing specifically on injury prevention among athletes and 2,973 (36.1%) related to sports rehabilitation. The growth of publications in prevention-related literature saw minimal increases during the 1940s and 1970s (57 articles) but experienced a sharp rise after 1975, with a slight dip between 1986 and 1995 (perhaps economically related, Schaede, 1991). On the other hand, the growth pattern of publications in rehabilitation-related literature began in 1973 and has steadily increased since then. Overall, year-to-year, it can be stated that the amount of prevention-related literature was greater than that of rehabilitation-related literature.

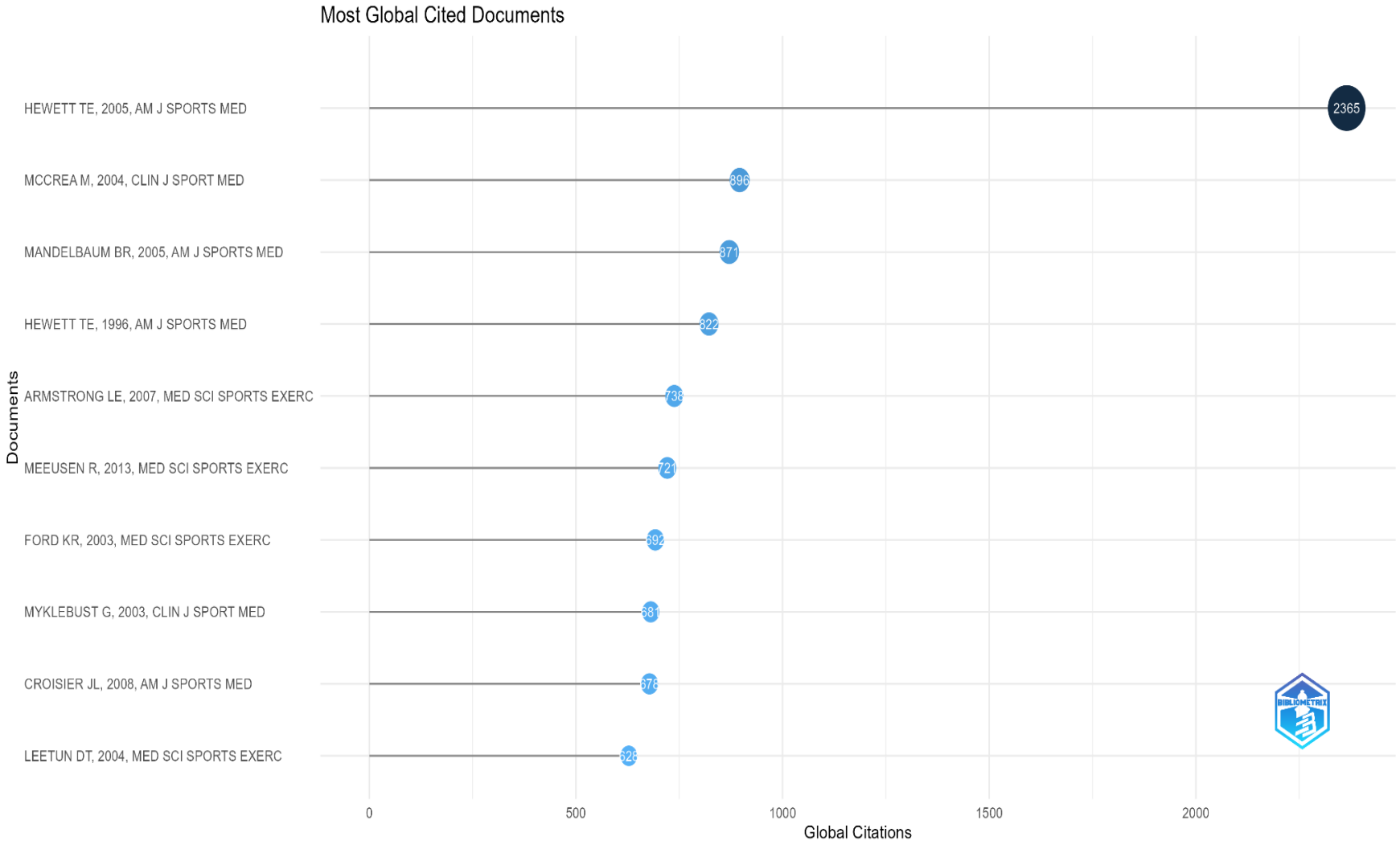
3.2 RQ2: Most Prolific Researchers and Countries

3.2.1 Most Cited Publications

The 10 most cited publications pertaining to injury prevention and rehabilitation are presented in Figures 6 and 7, respectively. Each document is specified in rank order alongside the total number of citations, and citation density. Among the top ten prevention articles, the most cited article by Hewett (2005) was cited 2,365 times while the least cited article was by Leetun (2004) cited 628 times.

Figure 6

Top 10 Most Cited Articles Concerning the Prevention of Sports Injuries



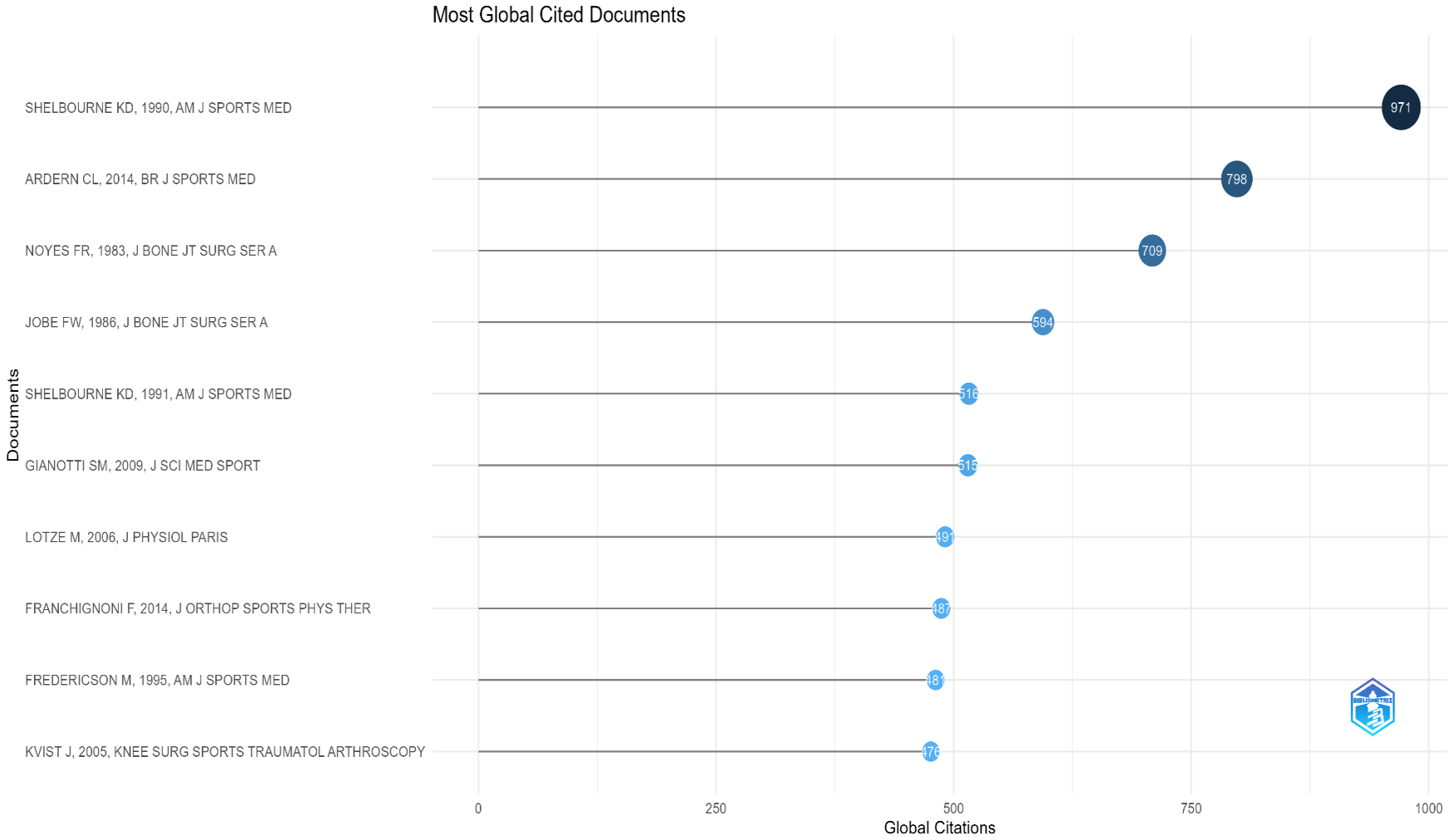
The research conducted by Hewett et al. (1996, 2005), Mandelbaum et al (2005), Ford et al. (2003), Myklebust et al. (2003), Croisier et al. (2008) and Leetun et al. (2004) investigated various interventions with the aim of preventing lower extremity injuries, particularly those affecting the anterior cruciate ligament (ACL). The highest cited article by Hewett (2005), with a total 2,365 citations, presented a prospective cohort study in badminton, revealing that female athletes with a heightened knee abduction angle and knee abduction moment faced elevated ACL injury risks during the landing phase. This finding hinted at a potential link between torsional stiffness and ACL injury rates, prompting further exploration of interventions aimed at optimizing torsional stiffness to prevent ACL injuries (e.g., Powers, 2010; Plisky et al., 2006).

The second most cited article by McCrea et al (2004) investigated the frequency of unreported concussion in high school football players. All of the aforementioned articles delved into traumatic injuries among athletes, while Armstrong and colleagues (2007) discussed strategies to prevent exertional heatstroke, and Meeusen et al (2013) outlined approaches to manage overtraining.

Figure 7 illustrates the top ten most cited articles pertaining to the field of sports rehabilitation. In this instance, the most cited article was by Shelbourne & Nitz (1990) with 971 citations with the least most cited article by Kvist et al. (2005) with 476 citations. Similarly, based on an examination of the cited articles for the given period (Figure 7), it was found that the ACL stands out as the most widely discussed topic. Out of the 10 articles examined, six delved into diverse inquiries related to the ACL (Ardern et al., 2014; Noyes et al., 1983; Shelbourne et al., 1991; Simon et al., 2009). In addition, Fredericson and colleagues (1995) investigated tibial stress reactions in runners. In addition, Jobe et al. (1986) work focused on the upper extremities, specifically, research on the rehabilitation process for athletes who underwent reconstruction of the ulnar collateral ligament. Quite dissimilarly, Lotze & Halsband (2006) undertook a study focusing on mental training techniques such as imagery and the use of motor imagination in the rehabilitation of athletes dealing with either limb amputation or complete spinal cord injury. The eighth most cited article by Franchignoni et al., (2014) outlined the minimal clinically significant differences between two assessment tools for upper-limb musculoskeletal disorders: Disabilities of the Arm, Shoulder, and Hand (DASH) and its abbreviated form, QuickDASH.

Figure 7

Top 10 Most Cited Articles Concerning the Rehabilitation of Sports Injuries



3.2.2 Most Cited Publications in the Last Decade

As the majority of the articles were over 10 years old, we decided to contrast current trends with an illustration of the most cited articles from the past decade (Figures 8 and 9). Of the 10 articles in the injury prevention category (Figure 8), six relate to topics such as overtraining syndrome (Meeusen et al., 2013), controlling sport loads (Bourdon et al., 2017; Soligard et al., 2016), management of sport concussion (Broglio et al., 2014), overuse injuries and burnout among young athletes (DiFiori et al., 2014) and exertional heat illnesses (Casa et al., 2015). The rest of the articles focus on the analysis and prevention of traumas among football players (Hägglund et al,, 2013; Akenhead & Nassis, 2016), endurance runners (Daoud et al., 2012), and athletes experiencing ACL injuries (Kristianslund et al., 2014).

Articles in the rehabilitation category (Figure 9) comprise papers devoted to return to sport (Ardern et al., 2016), scapular dyskinesis in shoulder injuries (Kibler & Sciascia, 2010; Kibler et al., 2013), “successful outcomes” after ACL injury and reconstruction (Lynch et al., 2015), guidelines for resuscitation (Perkins et al., 2015), chronic ankle instability (Hertel & Corbett, 2019), sport-related concussion (Schneider et al., 2014), and rates of return to play after ACL injuries in men’s professional football (Waldén et al., 2015).

Figure 8

Characteristics of Top 10 Most Cited Articles Concerning the Prevention of Sports Injuries for the Last Decade

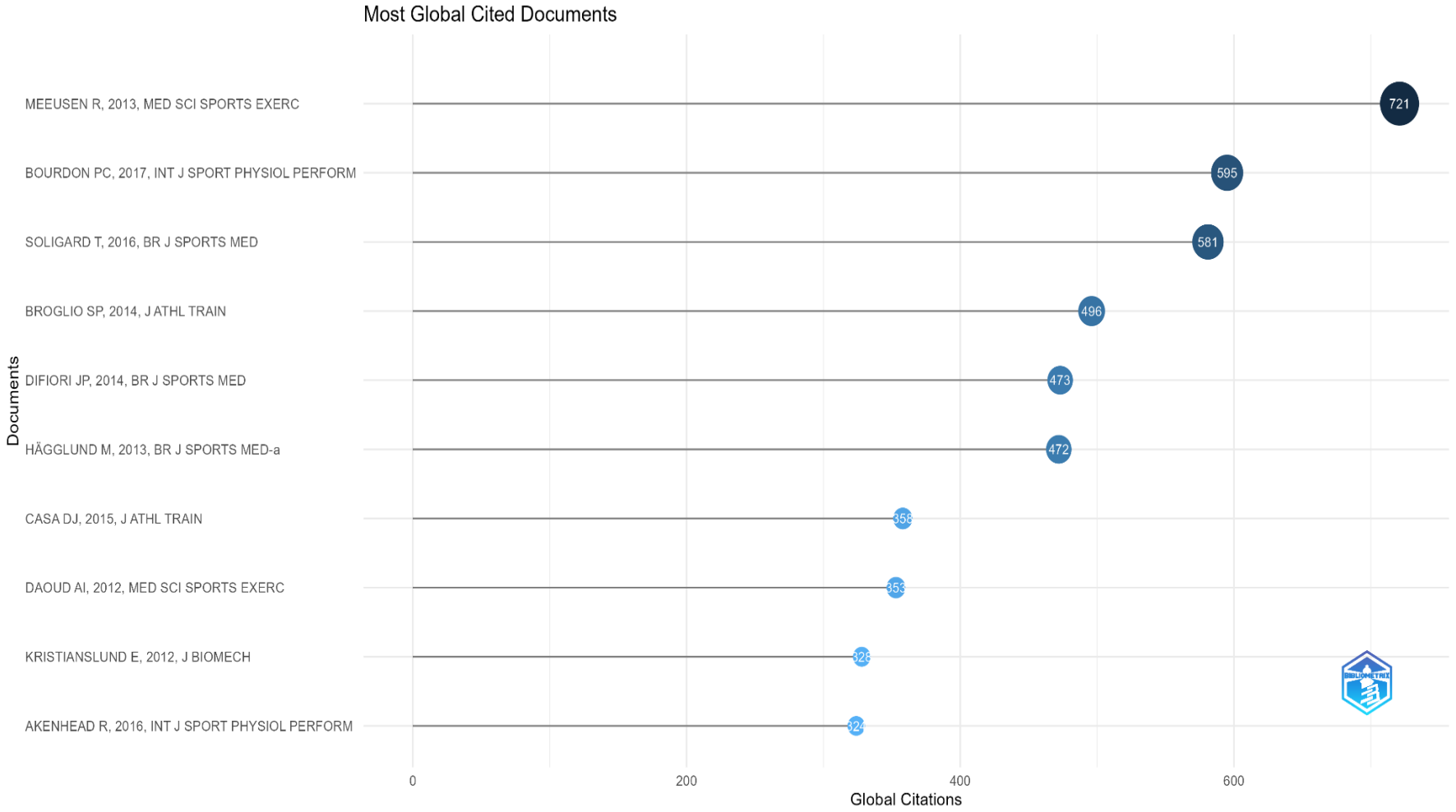
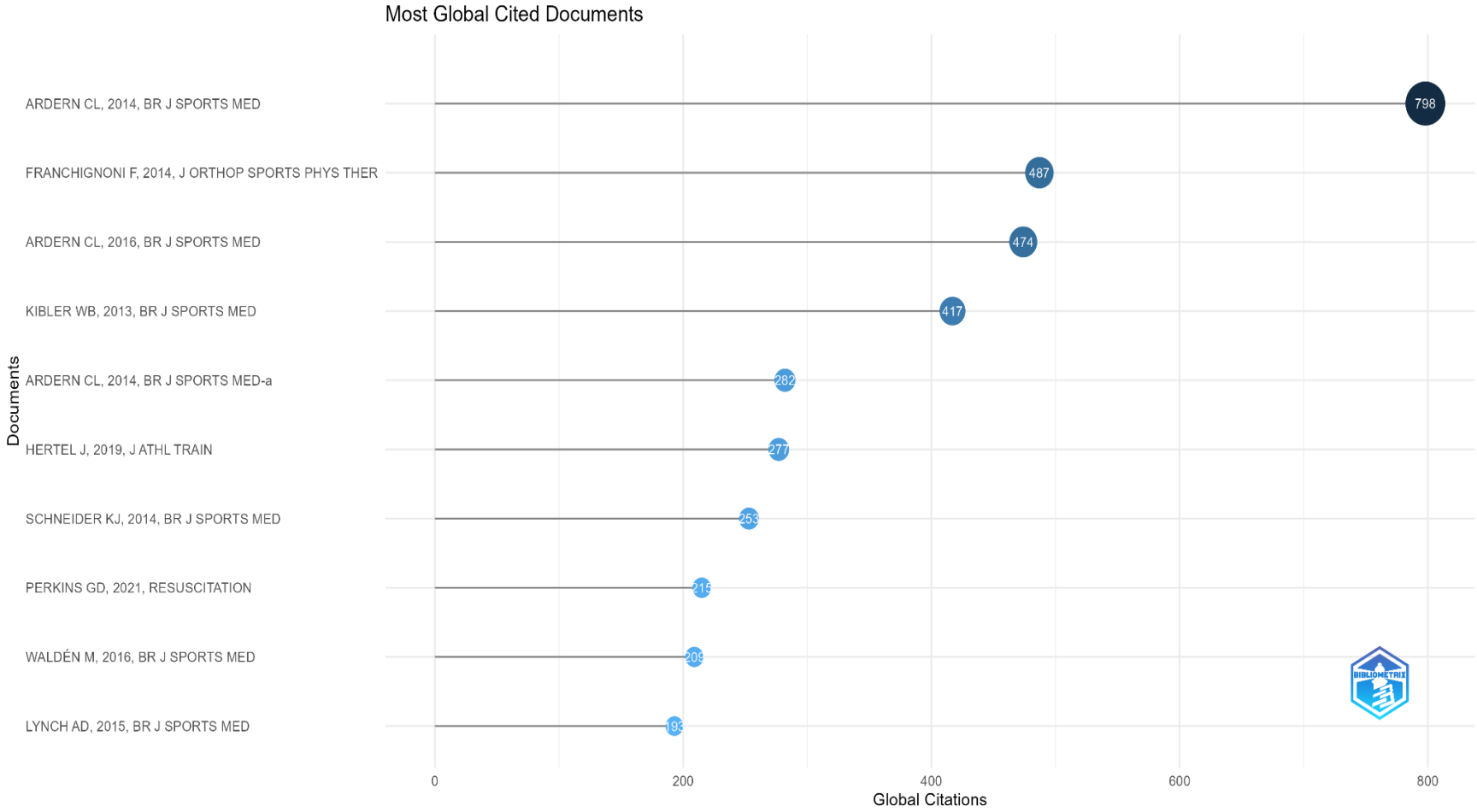


Figure 9

Characteristics of Top 10 Most Cited Articles Focusing on the Rehabilitation of Sports Injuries for the Last Decade



3.2.3 Top Ten Journals by Publication Count

Tables 1 and 2 present the top 10 journals by publication count. A total of 5,269 articles focusing on sports injury prevention were published across 893 journals. In the field of rehabilitation, 2,973 articles were distributed among 618 journals. Leading the pack, the “British Journal of Sports Medicine” emerged as the most prolific journal, closely followed by the “American Journal of Sports Medicine”. The “Journal of Sport Rehabilitation” boasted the highest publication count at 159 articles, with the “American Journal of Sports Medicine” trailing closely behind at 143 articles. Assessing impact factors, both in the sports injury prevention and rehabilitation fields, the “British Journal of Sports Medicine” secured the top spot, followed by the “American Journal of Sports Medicine”. All journals, with the exception of the “Journal of Sport Rehabilitation”, and “PM and R” (Physical Medicine & Rehabilitation), are categorized as Q1 by Scopus (2024, March).

Table 1

Most Relevant Sources in the Injury Prevention Field

Source	Articles	Impact Factor	SJR (SCImago Journal Rank)	Quartile
British Journal of Sports Medicine	270	18.473	4.764	Q1
American Journal of Sports Medicine	259	7.392	2.477	Q1
Journal of Science and Medicine in Sport	205	4.597	1.324	Q1
Physician and Sportsmedicine	147	2.758	0.771	Q1
Journal of Athletic Training	146	3.824	1.427	Q1
Clinical Journal of Sport Medicine	132	3.454	0.851	Q1
Scandinavian Journal of Medicine and Science in Sports	127	4.1	1.331	Q1
Orthopaedic Journal of Sports Medicine	118	3.401	1.113	Q1
Journal of Strength and Conditioning Research	109	4.415	1.3	Q1
Medicine and Science in Sports and Exercise	105	4.029	1.734	Q1

Table 2

Most Relevant Sources in the Rehabilitation Field

Source	Articles	Impact Factor	SJR (SCImago Journal Rank)	Quartile
Journal of Sport Rehabilitation	159	2.203	0.538	Q2
American Journal of Sports Medicine	143	7.392	2.477	Q1
Journal of Athletic Training	97	3.824	1.427	Q1
Physical Therapy in Sport	96	2.92	0.88	Q1
Archives of Physical Medicine and Rehabilitation	86	4.06	1.062	Q1
British Journal of Sports Medicine	84	18.473	4.764	Q1
Knee Surgery, Sports Traumatology, Arthroscopy	76	3.8	1.789	Q1
Journal of Orthopaedic & Sports Physical Therapy	71	6.276	1.396	Q1
Medicine & Science in Sports & Exercise	68	4.029	1.734	Q1
PM AND R (Physical Medicine & Rehabilitation)	55	1.821	0.619	Q2

3.2.4 Most Productive Authors

A total of 14,752 individual authors in sport injury prevention and 9,470 authors in sports injury rehabilitation contributed 5,269 and 2,973 publications, respectively.

3.2.4.1 Authorship in Sports Injury Prevention

Figures 10 to 13 provide details pertaining to sports injury prevention, specifically, the most relevant authors, top authors' production over time, authors by local H-Index, and authors by local M-Index, respectively (note that the H-index represents the impact of a researcher's work based on the number of highly cited papers they have. It indicates both the productivity (number of papers) and the impact (number of citations) of a researcher's publications; the M-Index represents the average impact of a researcher's publications. It takes into account the total number of citations their papers have received and divides that by the total number of papers published. This metric gives an indication of the average impact per paper, providing a measure of the overall quality of a researcher's work).

Figure 10

Most Relevant Authors (Prevention)

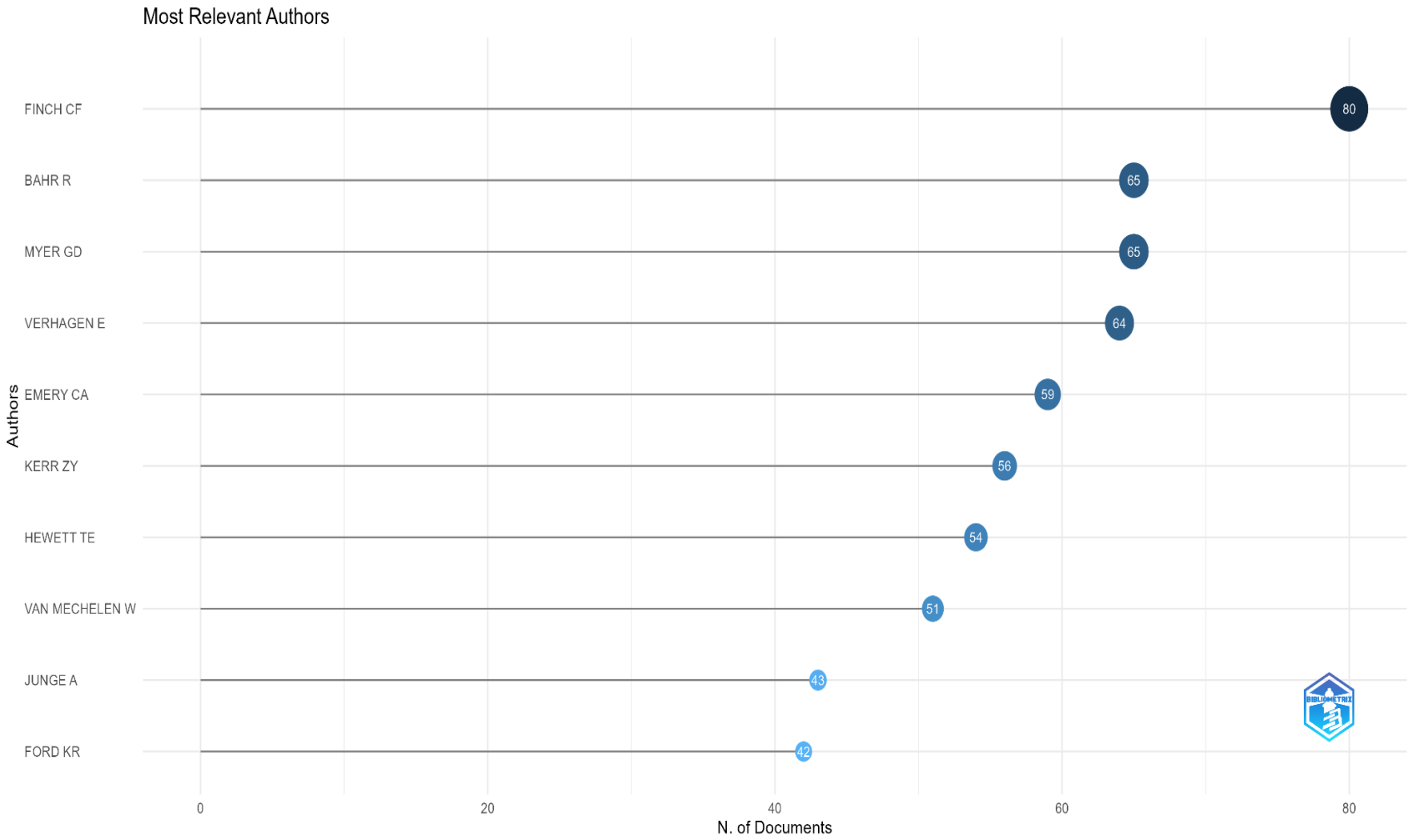


Figure 11

Top Authors Production Over Time (Prevention)

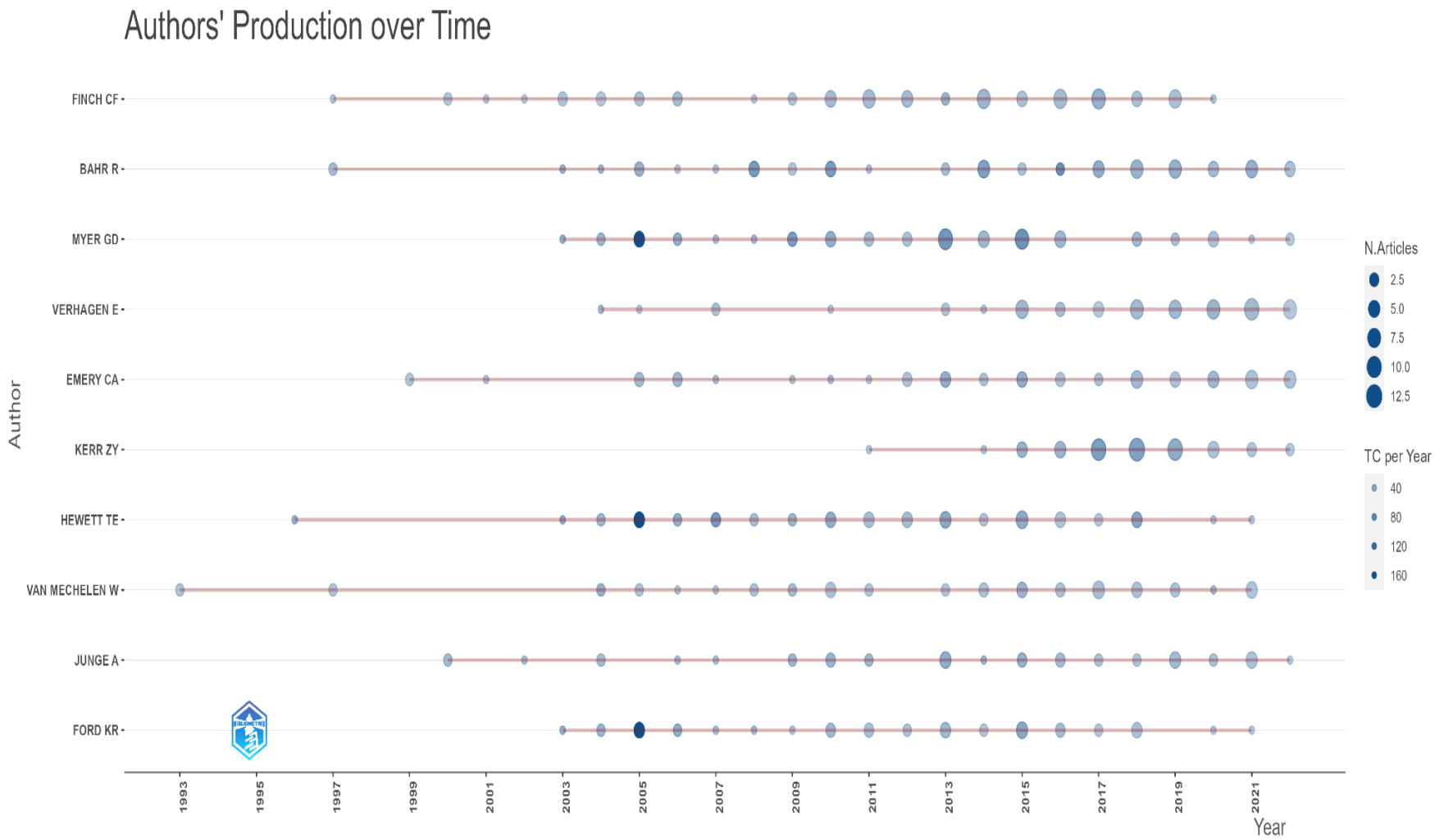


Figure 12

Authors Local Impact by H-Index (Prevention)

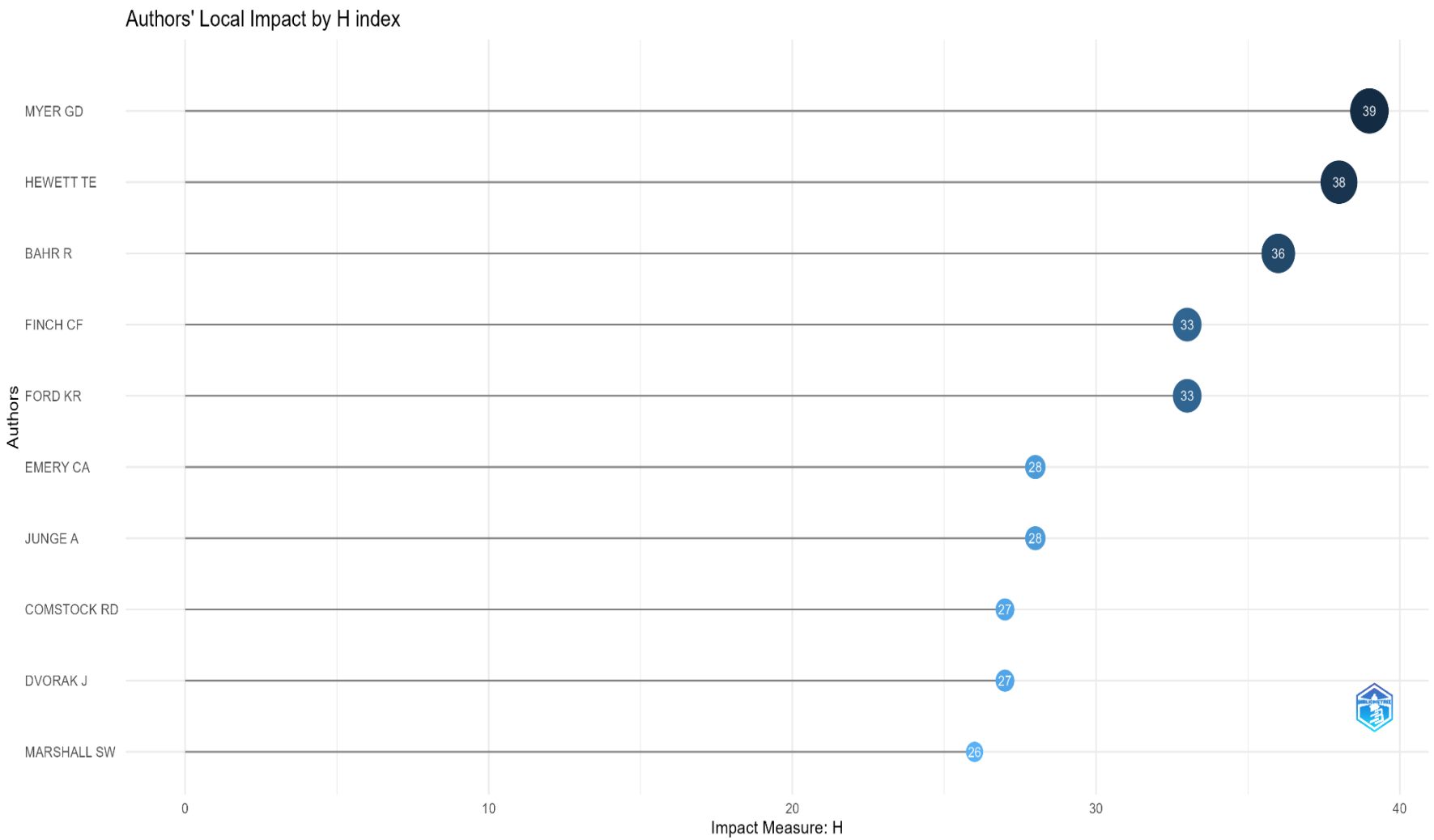


Figure 13

Authors Local Impact by M-Index (Prevention)

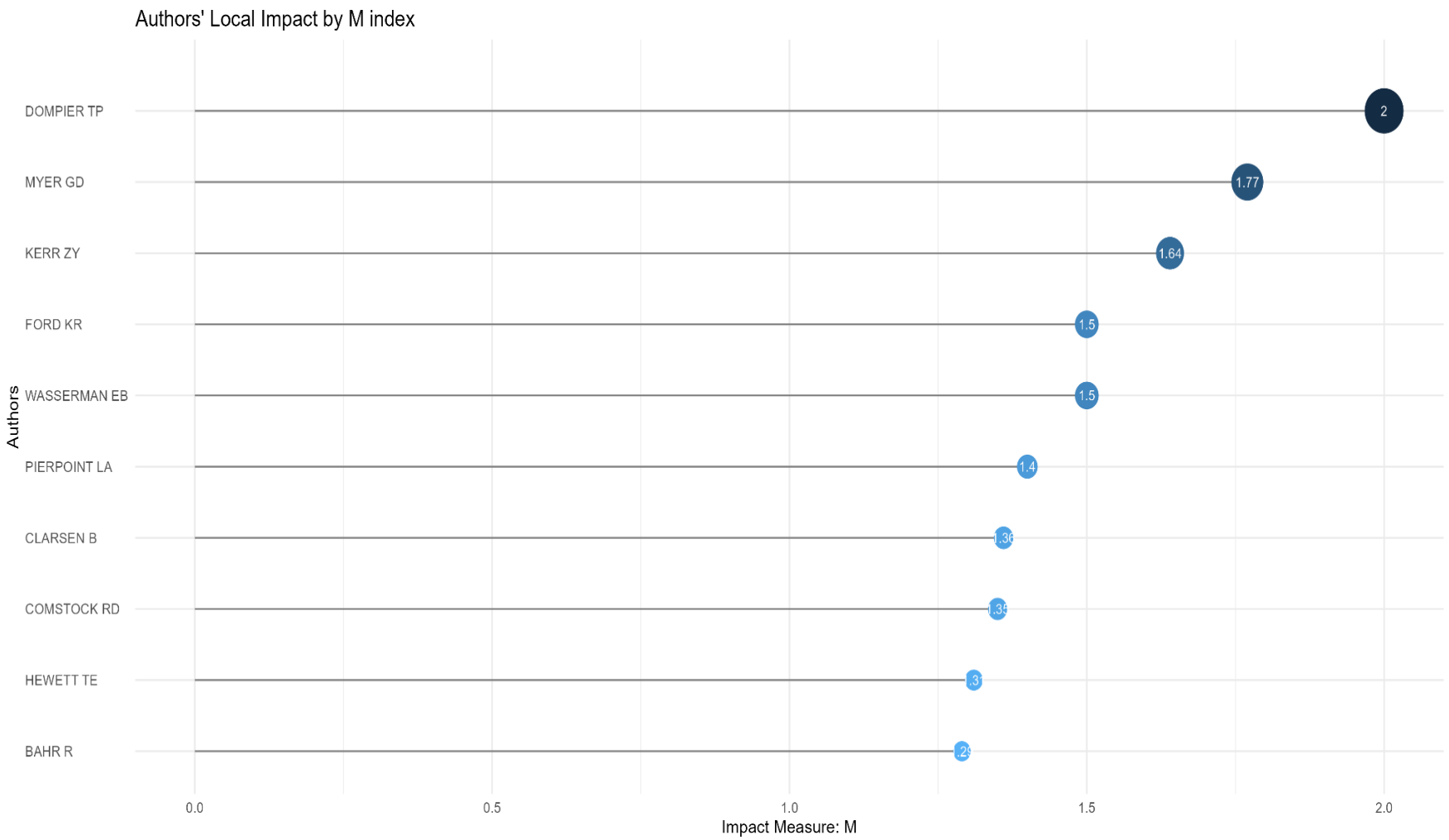
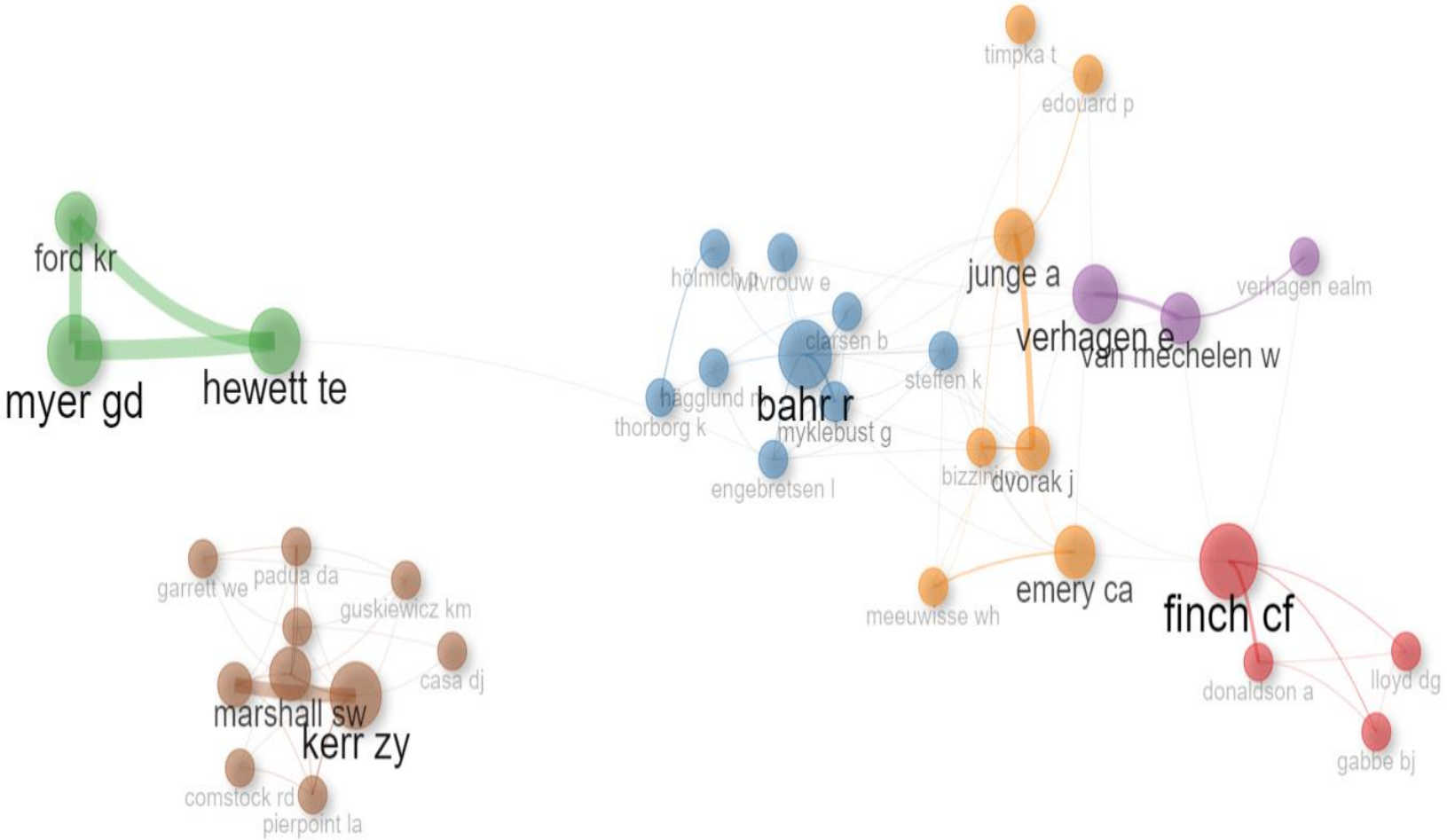


Figure 14 provides an illustration of the co-authorship bonds between authors publishing in the field of sport injury prevention.

Figure 14

Network Map of Co-Occurrence between Authors (Prevention)



In terms of publication output within the prevention group, Finch emerged as the most prolific author with 80 articles, constituting 1.52% of the total publications. Following closely behind were Bahr and Myer, each accounting for 1.24% of all articles. Upon closer examination, Myer demonstrated leadership in maintaining research quality over time, boasting an H-index of 49. In comparison, Hewett and Bahr trailed slightly behind with H-indices of 38 and 36, respectively. Finch and Ford shared the fourth position with a score of 33 each in terms of productivity. Dompier's M-index of 2 is commendable, trailing closely behind Myerwith 1.77 and Kerr with 1.64. This trio, comprising Myer, Dompier, and Kerr stands out as the most productive scientists in the field.

Furthermore, Figure 11 illustrates the top author's publication output from 1993 to 2022, indicating that a significant portion of the articles by the top author were published within a span of the last 20 years. In addition, the network map illustrating the co-occurrence between these authors in sports injury prevention research is depicted in Figure 14. Our analysis indicates that authors tend to collaborate primarily with others from the same country and often within the same affiliations. For instance, Kevin R. Ford, Gregory D. Myer, and Timothy E. Hewett (grouped in green) maintain particularly close cooperation among themselves. Notably, all three of these authors originate from the USA, with two of them affiliated with universities located in Ohio state.

3.2.4.2 Authorship in Sports Injury Rehabilitation

Figures 15 to 19 provide details pertaining to sports injury rehabilitation, specifically, the most relevant authors, top authors' production over time, authors by local H-Index, and authors by local M-Index, respectively.

Figure 15

Most Relevant Authors (Rehabilitation)

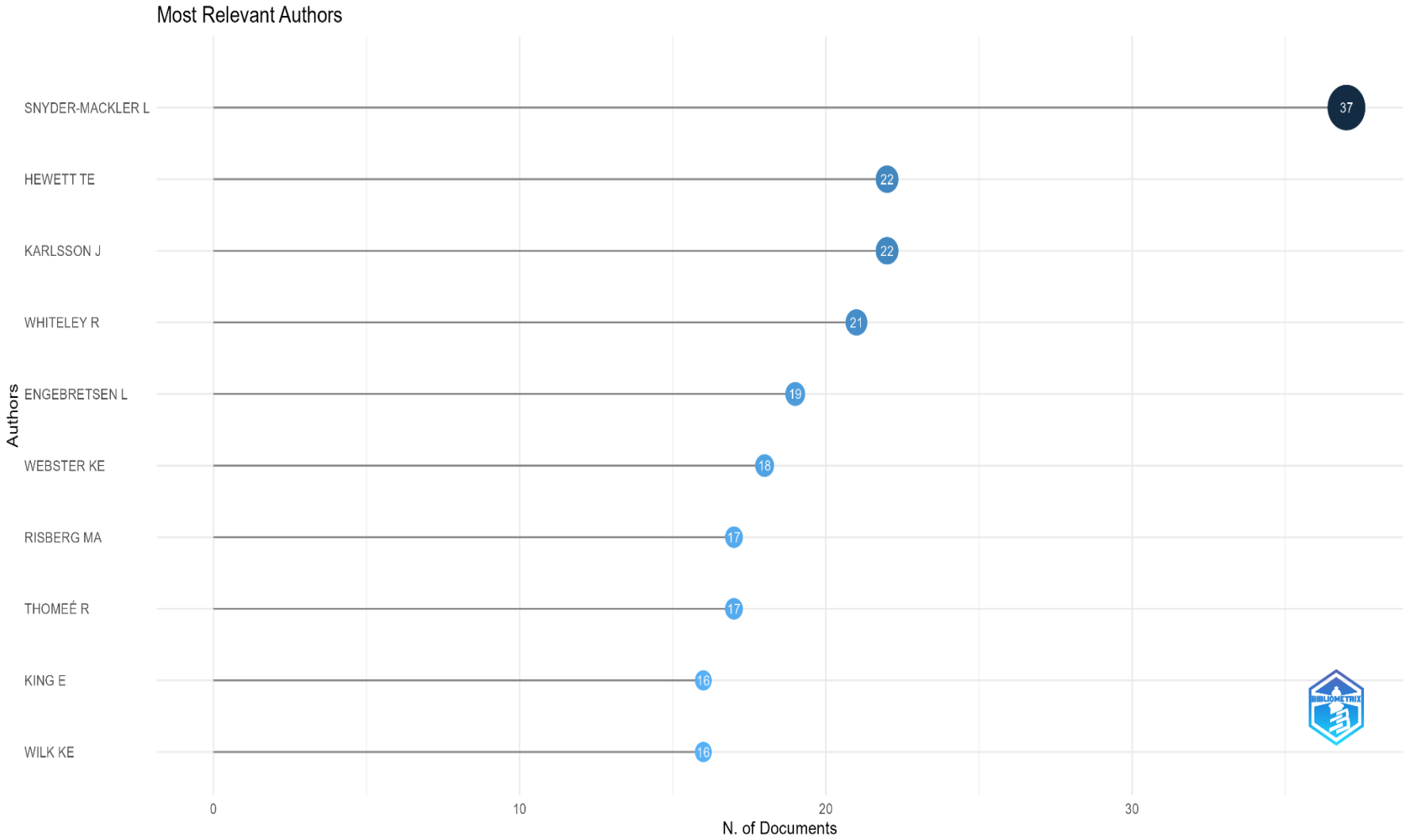


Figure 16

Top Authors Production Over Time (Rehabilitation)

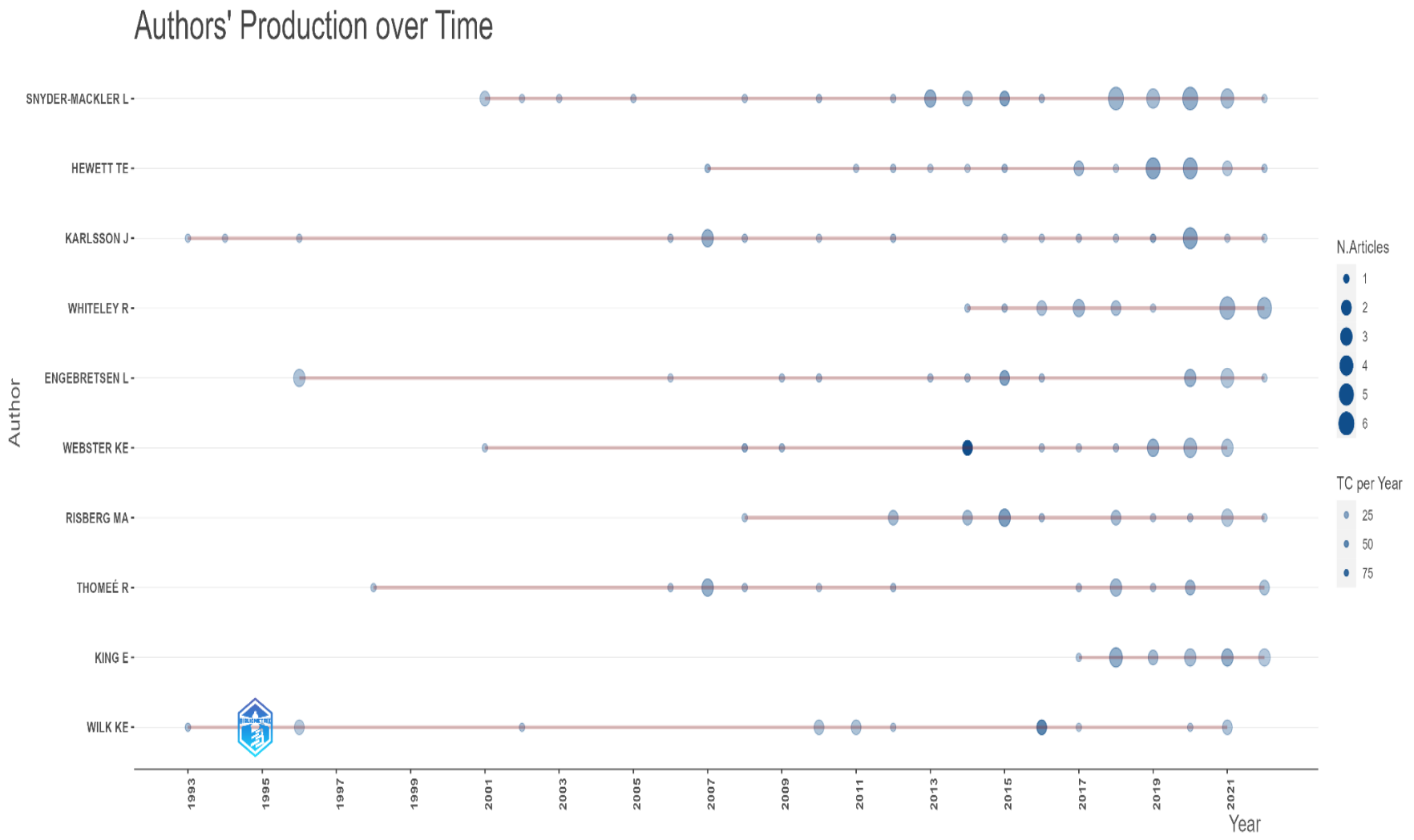


Figure 17

Authors Local Impact by H-Index (Rehabilitation)

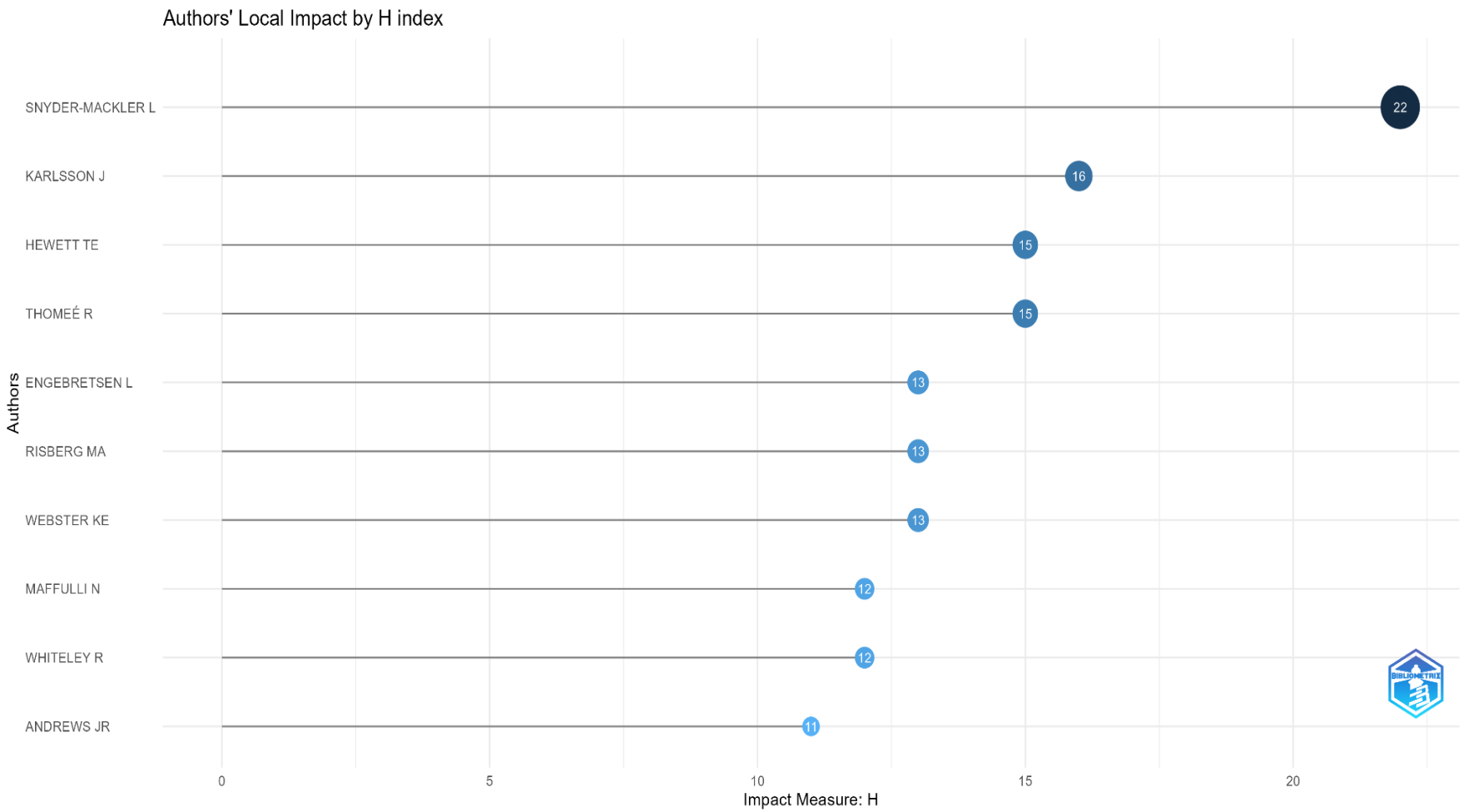
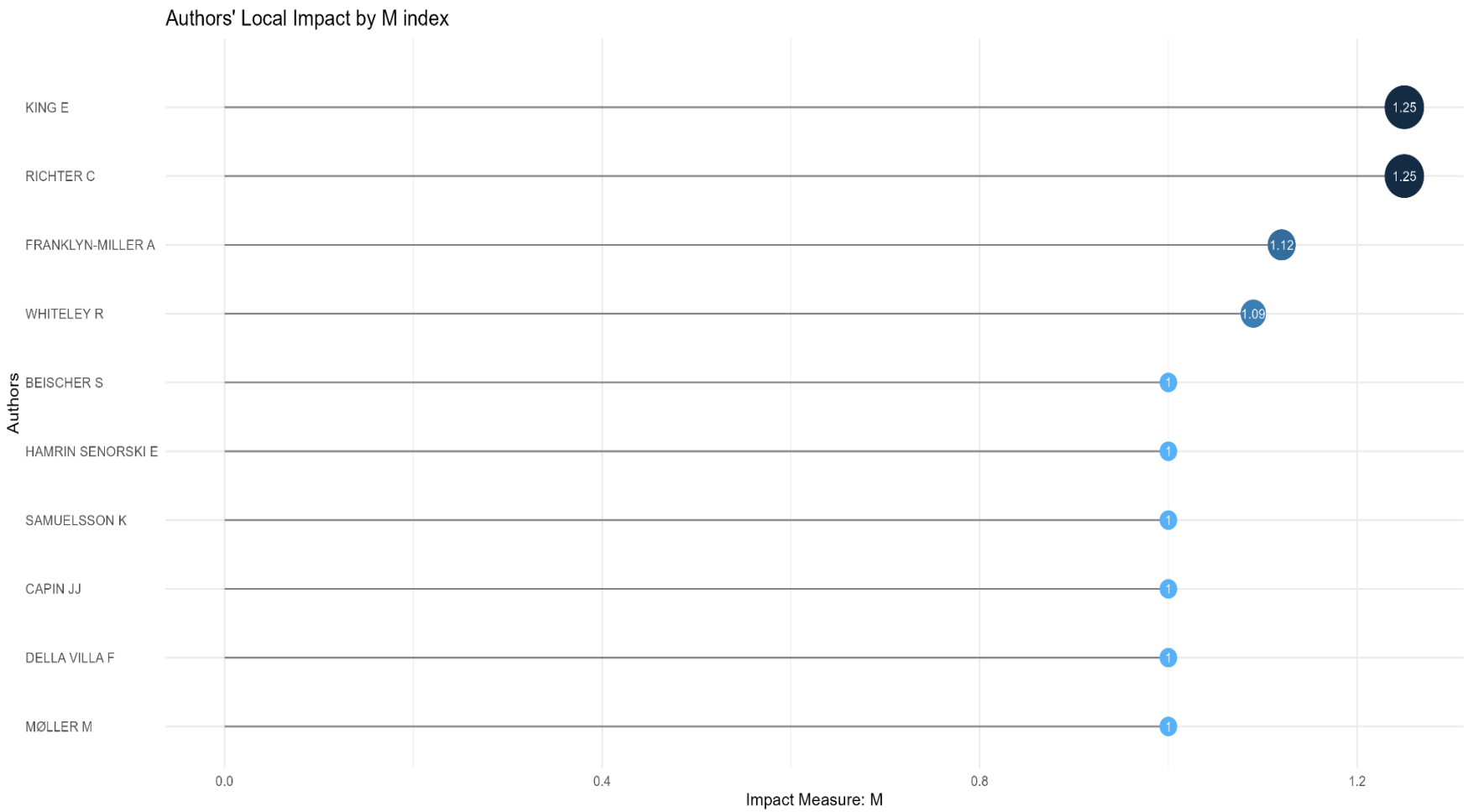


Figure 18

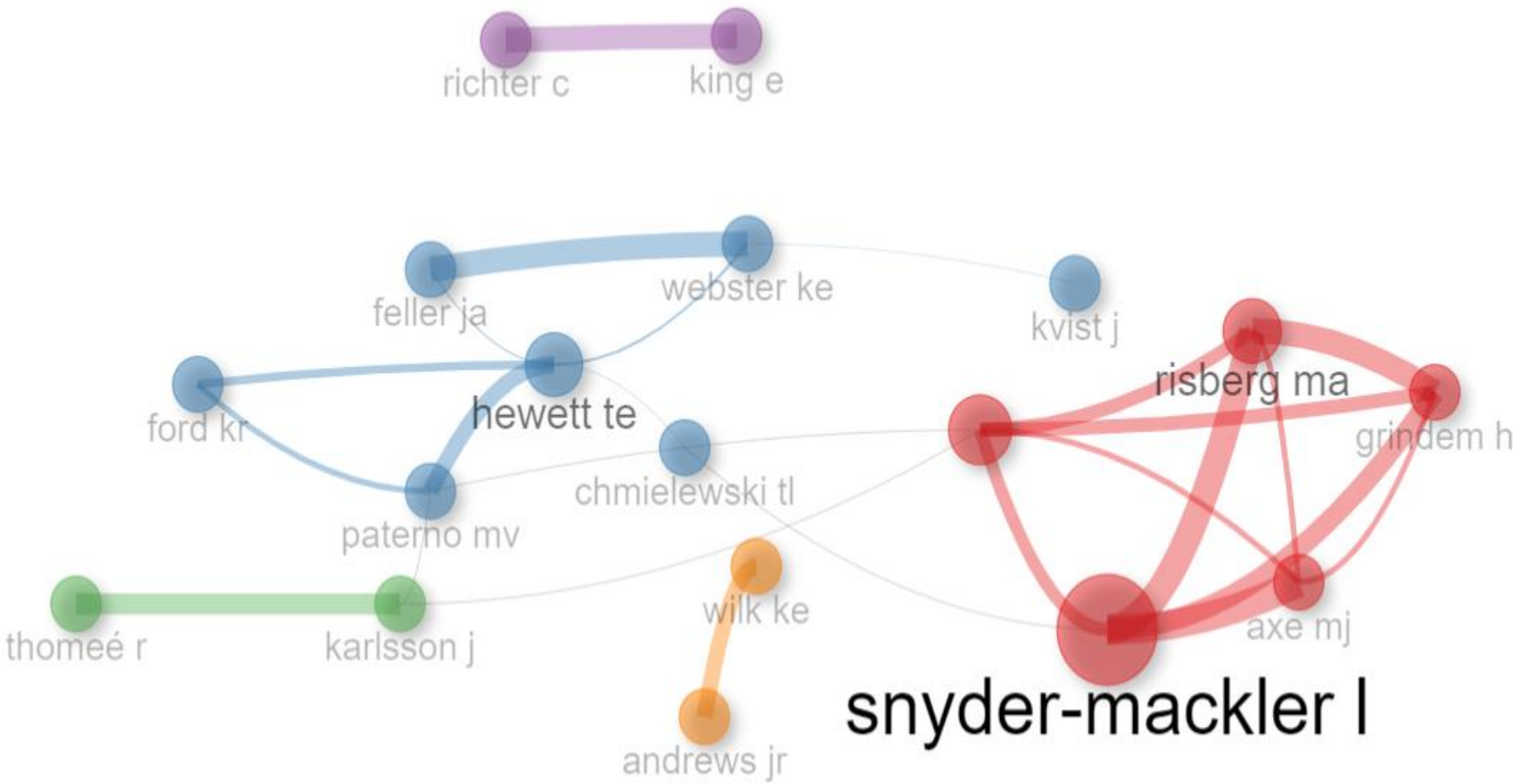
Authors Local Impact by M-Index (Rehabilitation)



In Figure 19, we analyzed a collaboration network involving 17 authors who jointly authored over five publications. This network map depicted the connections between prominent authors in the field of sports injury rehabilitation research. It was observed that authors in the rehabilitation domain often collaborated on an international scale, unlike those in injury prevention. For instance, Lynn Snyder-Mackler, representing the USA, had significant co-authorship ties with May Arna Risberg and Hege Grindem from Norway.

Figure 19

Network Map of Co-Occurrence between Authors (Rehabilitation)



In terms of publication output within the rehabilitation group, Snyder-Macler emerged as the most prolific author with 37 articles, accounting for 1.25% of the total publications. Following closely behind were Hewett and Carlsson, each with 22 articles. In terms of the H-index, the same scientists maintain the top three positions with Snyder-Macler retains first place with an H-index of 22. However, Carlsson has surpassed Hewett by one point, with H-indices of 16 and 15, initially. Regarding the M-index, King E and Richter share first place with a score of 1.25, while Franklyn-Miller secures the third position with an M-index of 1.12. Unlike the injury prevention field, where there has been a steady increase in the number of articles for the last 20 years, we observe a noticeable rise in publications in rehabilitation only in the last decade, as depicted in Figure 16.

3.2.5 Most Productive Countries

This section is devoted to providing an illustration of the most cited countries for research outputs in injury prevention and rehabilitation studies. Figures 20 and 21 provide an illustration of the most cited countries in this regard.

Figure 20

Most Cited Countries in Injury Prevention Research

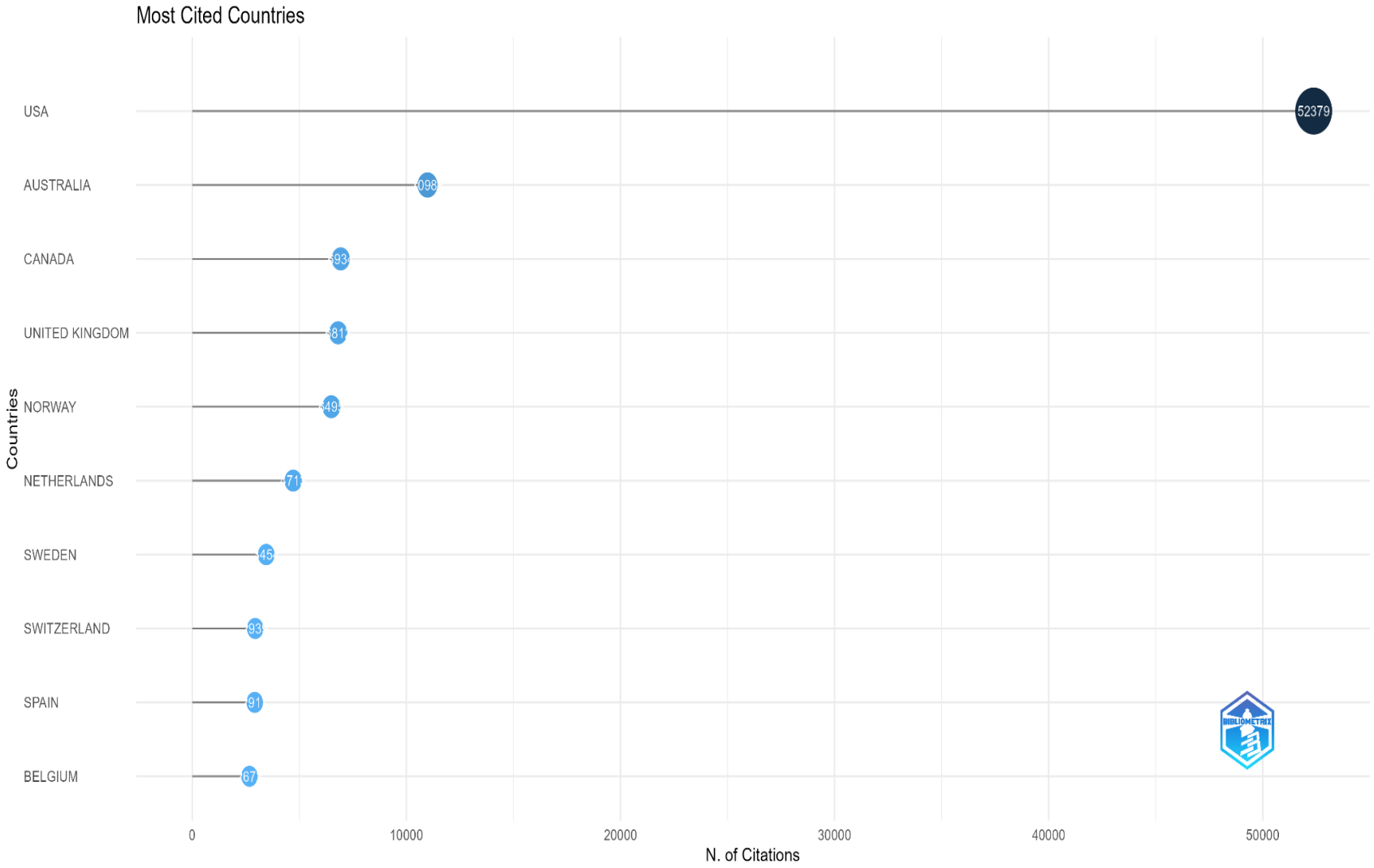
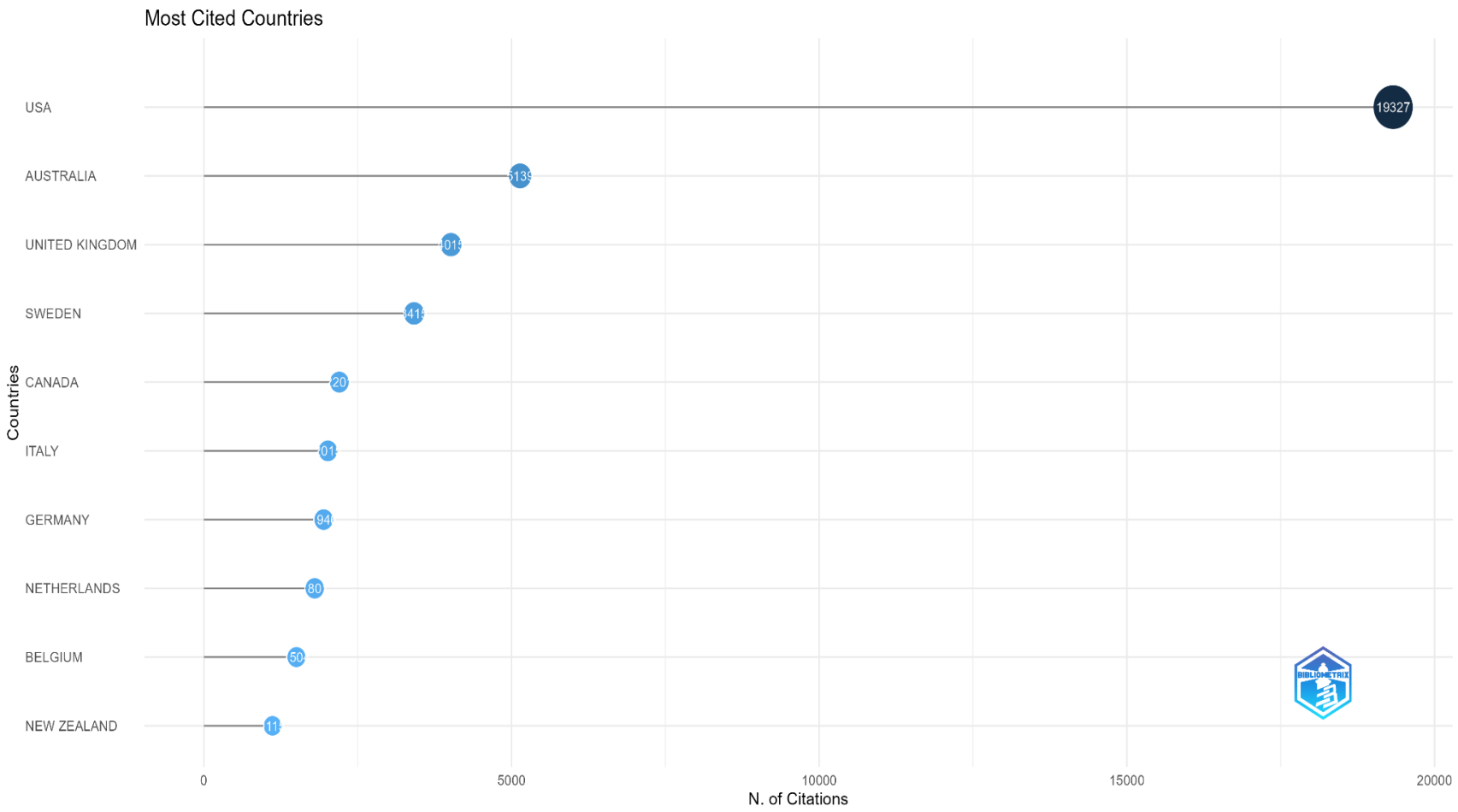


Figure 21

Most Cited Countries in Injury Rehabilitation Research



A total of 73 countries participated in the exploration of the field. The United States contributed the highest number of citations in both fields, with 52,379 and 19,327 citations, respectively, followed by Australia with 10,988 and 5,139 citations, respectively. Canada played a more significant role in the prevention category, contributing 6,934 citations, while the United Kingdom secured the third position in the rehabilitation group with 4,015 citations. The collaborative relationships among these countries are presented in Figures 22 and 23, where the thickness of the lines signifies the strength of the relationships. The United States (USA) holds a paramount role in global cooperation and maintains close collaborations with Canada, Australia, and the United Kingdom.

3.3 RQ3: Most Collaborative Countries

This section is devoted to providing an illustration of the most collaborative countries for research outputs in injury prevention and rehabilitation studies. Figures 22 and 23 provide an illustration of the most collaborative countries in this regard.

Figure 22

Collaboration Network Analysis of Countries in the Injury Prevention Field

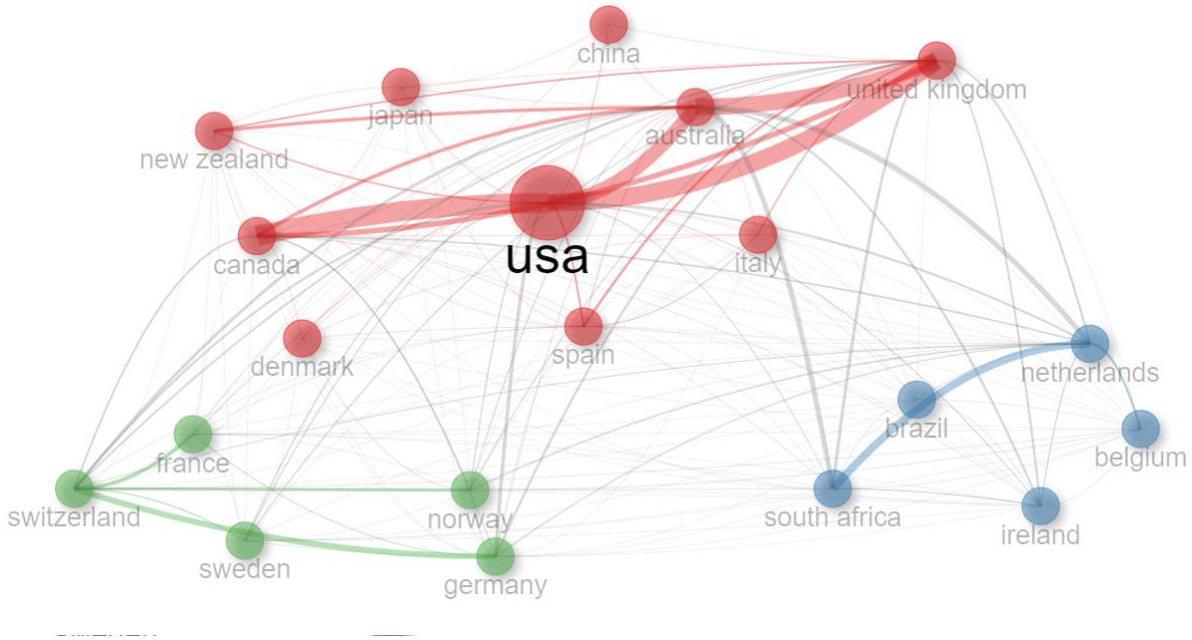
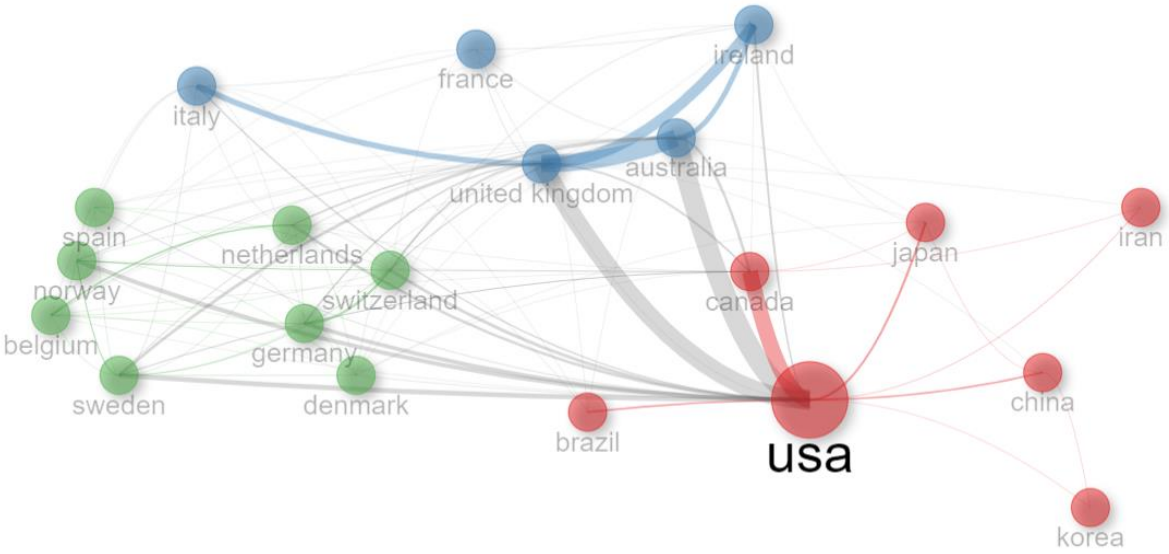


Figure 23

Collaboration Network Analysis of Countries in the Injury Rehabilitation Field



A total of 3,566 institutions participated in this research (i.e., those illustrated vis-à-vis Figures 22 and 23). In terms of breakdown by actual institutional affiliation, the majority of the articles were produced by the University of Calgary (Canada), with 301 records in the prevention category, and the University of Delaware (USA), with 108 records in the rehabilitation group (see Figures 24 and 25 for breakdown by institutional affiliation). Following closely were the University of North Carolina (USA) with 223 records and La Trobe University (Australia) with 61 records. Furthermore, the institutional connections among these listed affiliations are illustrated in Figures 26 and 27.

Figure 24

Most Relevant Affiliations in the Injury Prevention Field

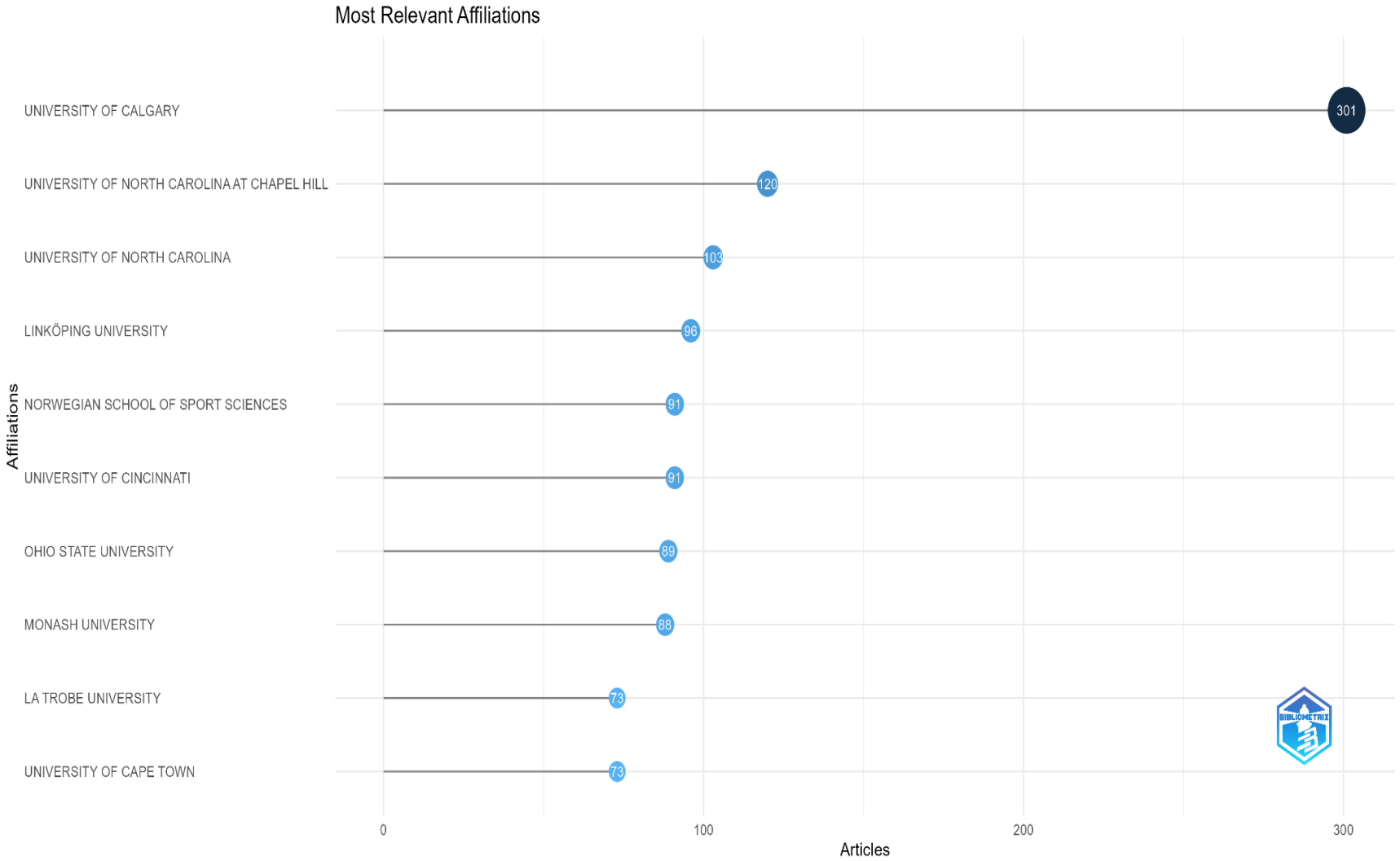


Figure 25

Most Relevant Affiliations in the Injury Rehabilitation Field

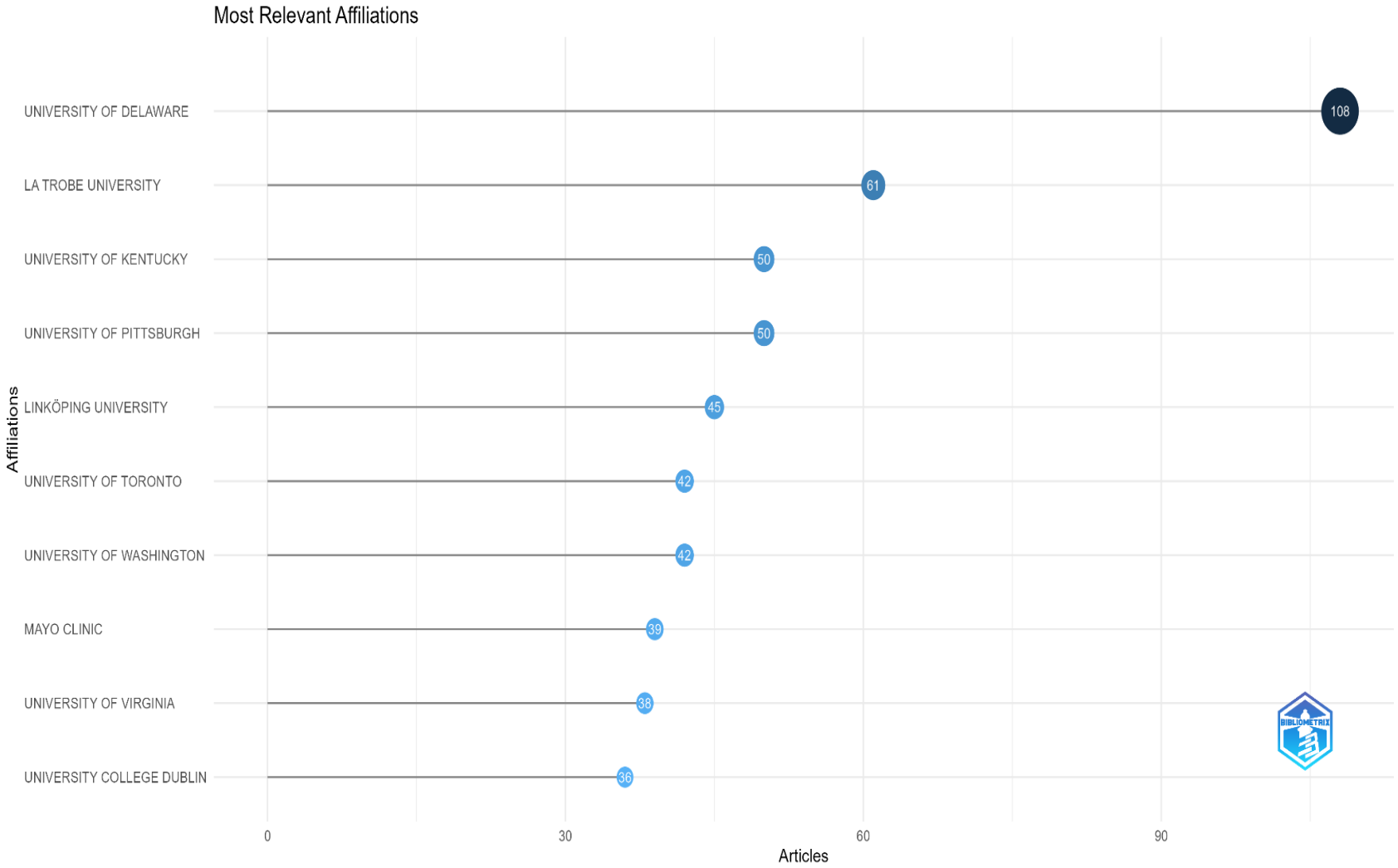


Figure 26

Collaboration Network Analysis of Institutions in the Injury Prevention Field

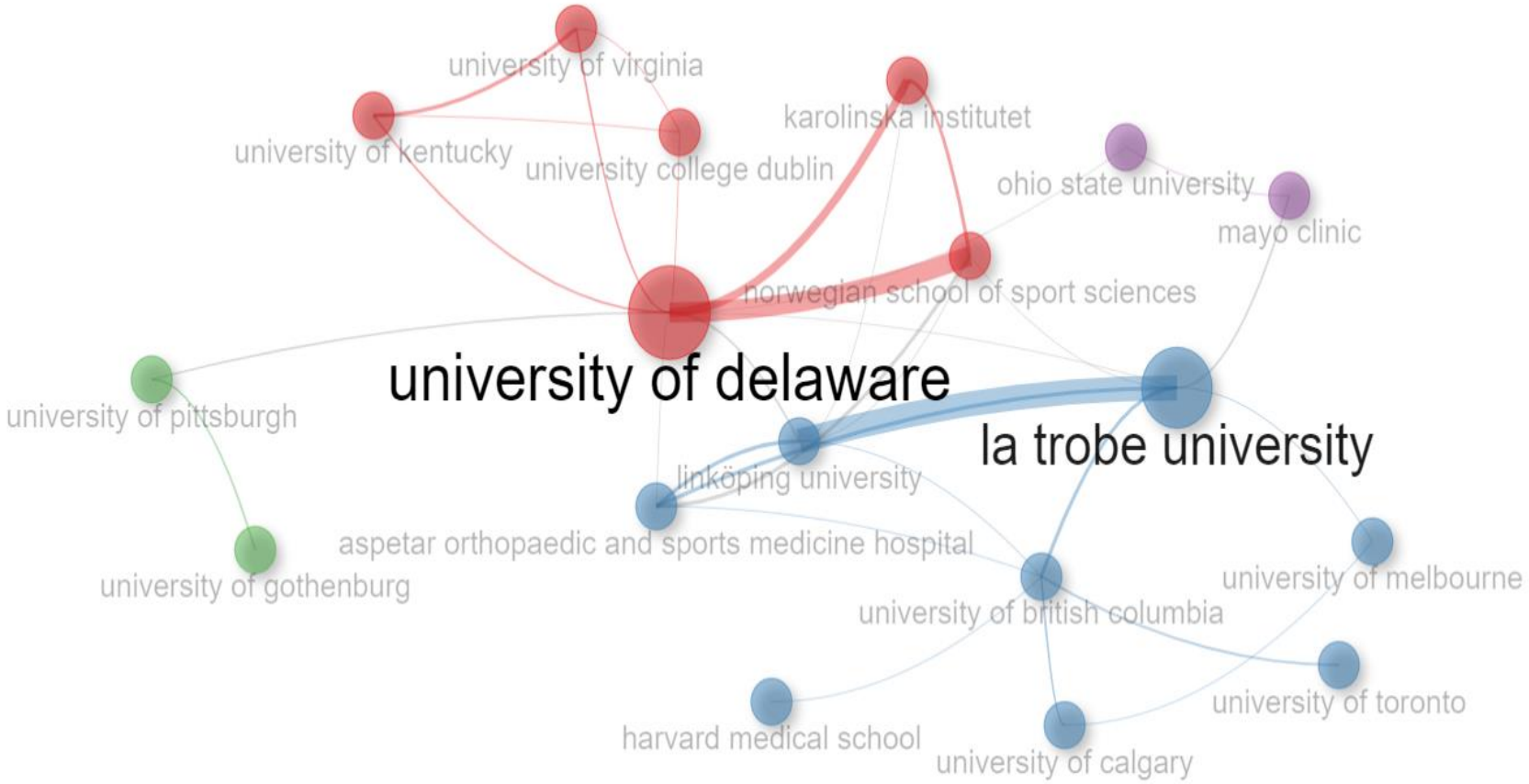
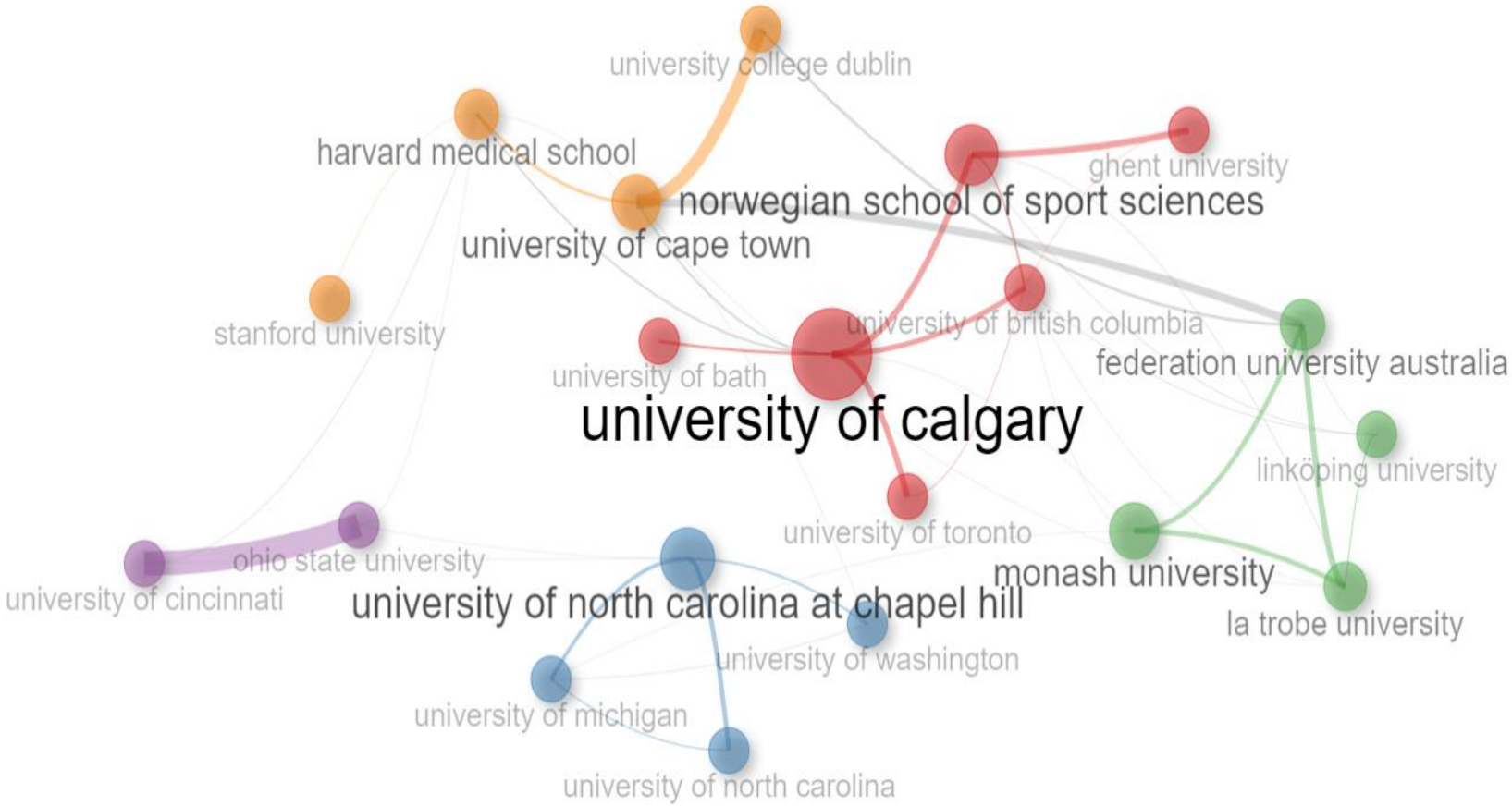


Figure 27

Most Relevant Affiliations in the Injury Rehabilitation Field



3.4 RQ3: Most Popular Topics and Concepts

This section provides details as to the most popular topics and concepts studied in the field of sports injury prevention and rehabilitation. Figure 28 provides an illustration of the most popular topics and concepts for the field of sports injury prevention research, while Figure 29 depicts the most prominent topics studied in the field of sports injury rehabilitation.

Figure 28

Most Frequent Author Keywords in the Injury Prevention Field

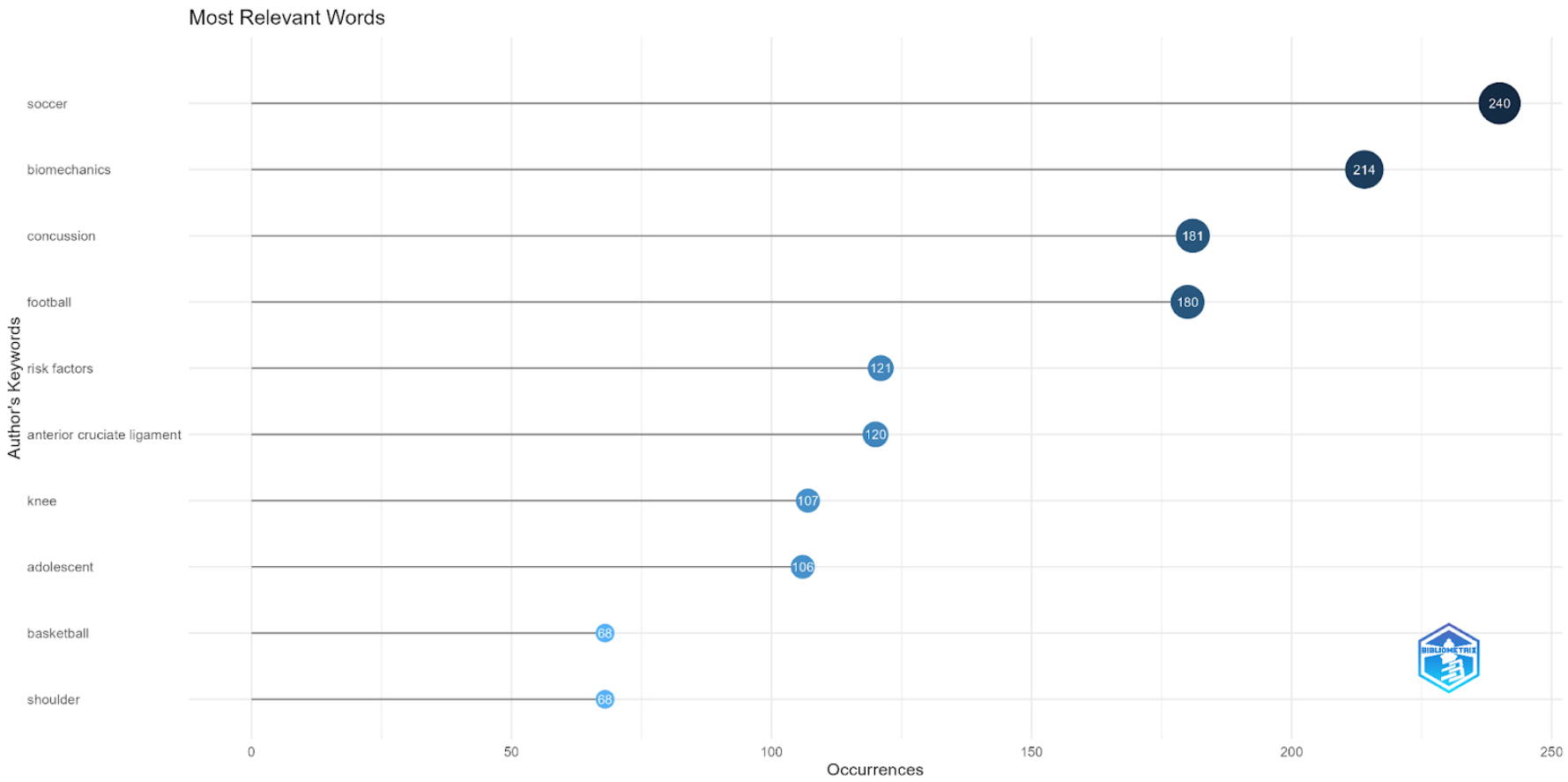
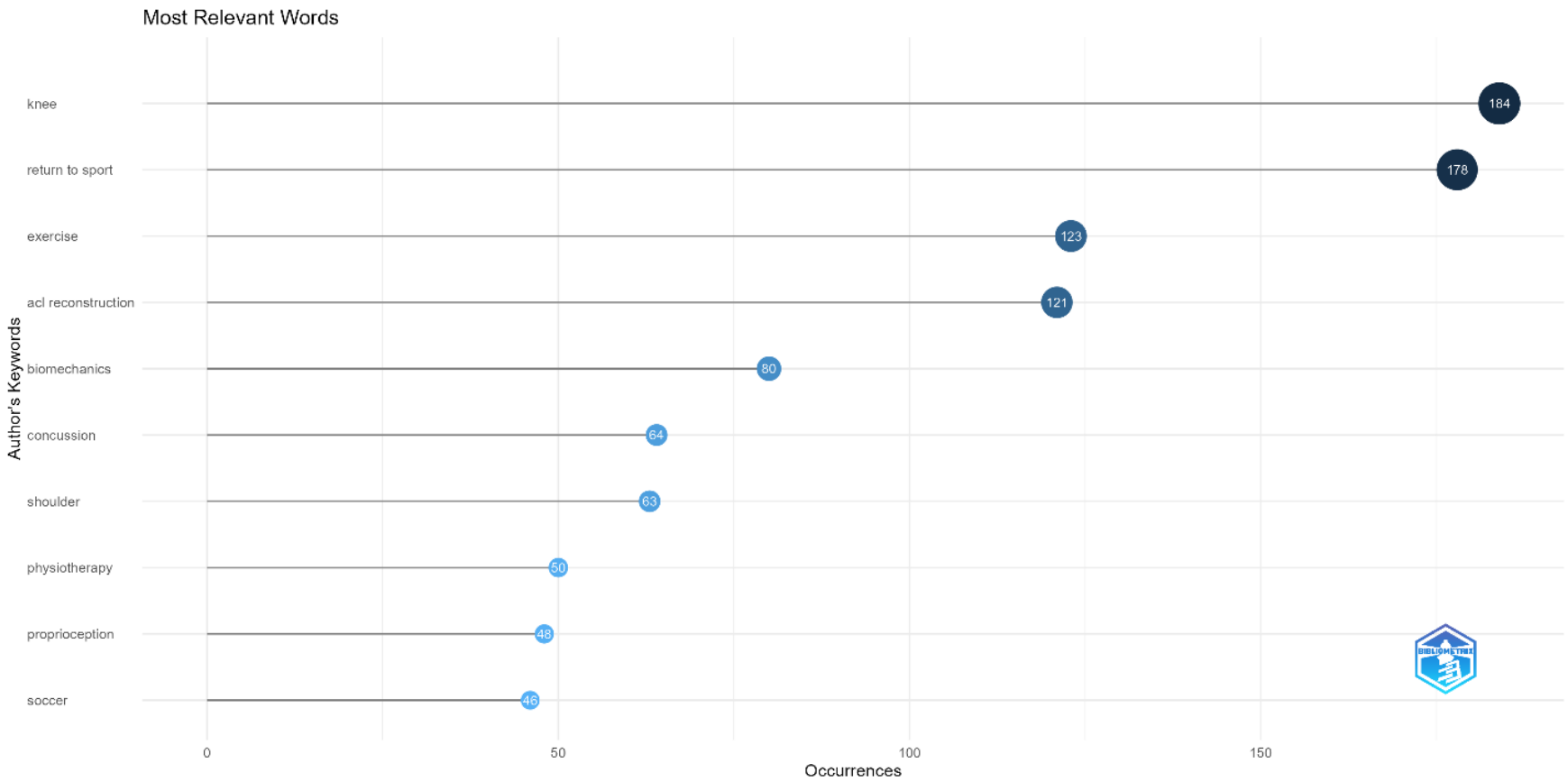


Figure 29

Most Frequent Author Keywords in the Injury Rehabilitation Field



Specifically, Figures 28 and 29 illustrate the top 10 combinations of authors' keywords relevant to their respective topics. The term "soccer" emerges as the most frequently used keyword in the context of injury prevention, appearing 240 times, while "knee" stands out as the predominant keyword in the field of rehabilitation. Interestingly, towards the bottom of both top 10 lists, there is a notable shift in topics, with "shoulder" becoming prominent in the prevention category with 68 mentions, while "soccer" appears 38 times as a keyword in the rehabilitation section. This characteristic allows readers to identify articles that align with specific keywords, aiding in the recognition of research trends and gaps in research topics.

Figures 30 and 31 provide the results of the multifactorial cluster analysis of metadata for each field, respectively. This method is employed to identify pertinent keywords and their synonyms while assessing their interrelationships. It works by reducing the number of dimensions in the data, resulting in two-dimensional visualizations that illustrate the similarities between different data points. The terms that appear closer to the center of the map and are more widely dispersed are those that have received more attention in recent years. On the other hand, terms that are more evenly distributed across the map are associated with less frequently discussed research topics.

Figure 30

Multiple Correspondence Analysis of High-frequency Authors Keywords in Injury Prevention Articles

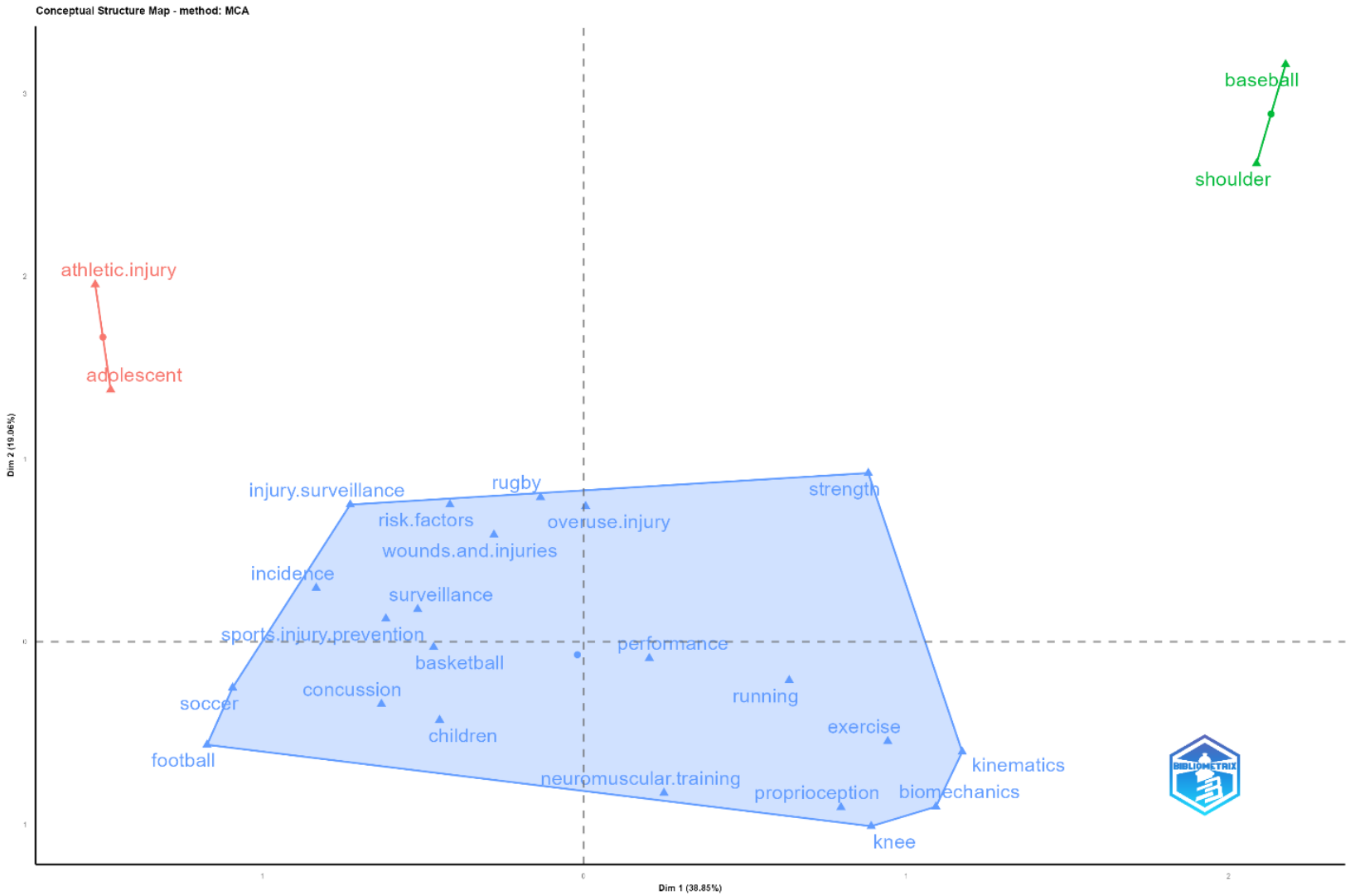
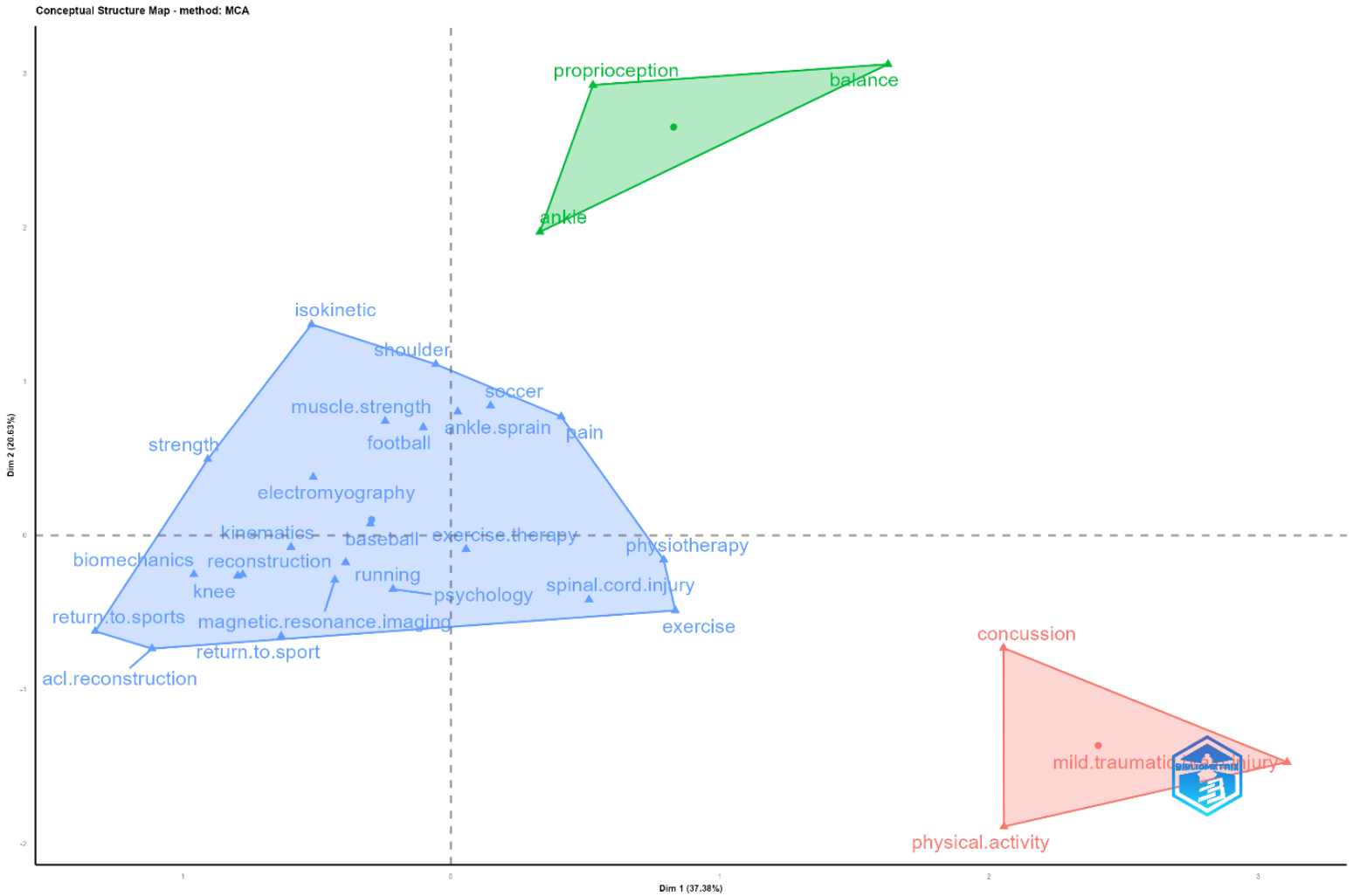


Figure 31

Multiple Correspondence Analysis of High-frequency Authors Keywords in Injury Rehabilitation Articles



Each field or subject clustering is represented by three categories: Cluster 1 (blue), Cluster 2 (red), and Cluster 3 (green). In the prevention research, there is a noticeable focus on sports such as basketball, soccer, football, and rugby, while baseball receives comparatively less attention. The prevention efforts aim to address pathologies such as concussions, overuse injuries, and wounds. On the other hand, in the rehabilitation field, baseball emerges as a primary focus, particularly concerning spinal cord injuries, ACL injuries and ankle sprains. These distinctions reflect the diverse areas of emphasis within sports injury prevention and rehabilitation research.

4. Discussion

In this study, we provided a bibliometric mapping of the current landscape of the field of sports injury prevention and rehabilitation by analyzing the contributions of countries, institutions, journals, authors, and highly-cited documents. Since the field emerged more than 80 years ago, the annual publication output in the field has increased steadily, especially in the last decade. With the largest number of publications and citations and the top rank for co-occurrence analysis by country, the United States is currently the world leader in both subfields. Even the institution, the University of Delaware, with the most publications in the rehabilitation field is located in the United States. These results suggest that the United States may have a significant impact on the direction of research in this field. Australia was ranked second in the total number of publications and the total citations; it was also ranked second in collaboration with other countries. The top two sources ranked by impact factor were “British Journal of Sports Medicine” and “American Journal of Sports Medicine” for rehabilitation. Finch, Bahr, and Myer were the most active authors in the field of injury prevention, while Snyder-Macler, Hewett, and Carlsson were most productive in rehabilitation.

We summarized the overarching trends spanning from 1947 to 2022, encompassing countries, institutions, journals, and authors. For example, research on injury prevention is predominantly featured in the “British Journal of Sports Medicine”, whereas the most prolific journal in the field of rehabilitation is the “Journal of Sport Rehabilitation”. The leading authors producing high-quality papers are affiliated with institutions in the USA, Canada, and Australia.

Injury prevention efforts are primarily concentrated on sports like basketball, soccer, football, and rugby, with comparatively less emphasis on baseball. Interestingly, the Sports Injury Rehabilitation group shows a significant focus on baseball. This discovery suggests that there may be a need for increased attention to baseball in the realm of preventive medicine in the future. The strong correlation between ankle, proprioception, and balance in the rehabilitation group, along with the absence of ankle-related topics in the injury prevention section, suggests a gap in the development of ankle injury prevention strategies.

5. Conclusion

The current study provides a comprehensive mapping of the literature of sports injury and rehabilitation byway of scientific maps encompassing journals, countries, documents, institutions, and authors to identify prevailing trends in this domain. Over the last two decades, there has been a consistent rise in global publication trends, particularly in the realm of sports injury prevention and rehabilitation, garnering substantial attention from the scientific community. Our findings highlight the United States as a significant contributor to this research area. Institutions such as the University of Calgary, University of North Carolina, and Linköping University have been recognized for their significant contributions through high-citation articles in sports injury prevention. Meanwhile, the University of Delaware, La Trobe University, and the University of Kentucky have emerged as particularly productive institutions in the field of rehabilitation. Notable researchers in this domain include Finch and Snyder-Macler. Researchers in both fields have shown significant interest in studying ACL injuries and concussions, making them the most prominent research directions.

It is logical to consider that baseball may need to receive more attention in preventive medicine in the future. This suggestion is based on the finding that injury prevention research is more focused on sports such as basketball, soccer, football, and rugby, while baseball receives comparatively less attention. This observation highlights a potential area for further emphasis and development in preventive strategies for baseball-related injuries, as well as ankle injuries specifically.

As there is a shortage of bibliometric studies on various treatment interventions, one potential avenue for future research could involve exploring different types of treatments.

Limitation of this study is the inability to conduct a comprehensive one-time bibliometric analysis across various databases like Scopus, Web of Science, Google Scholar and others.

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Open access archives (repository) to
the autonomous organization of education Nazarbayev University

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Signed: Marat Urazayev 23.04.2024 

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