



Original Article

## Mapping research trends of psychological status on temporomandibular disorders: A two-decade bibliometric overview

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### Abstract

**Aim:** Research on temporomandibular disorders (TMD) has increased rapidly over the past two decades. Studies have evolved from a biomechanical framework to an understanding centered on psychosocial factors. However, the global research map of the literature has not been evaluated using bibliometric methods. The primary objective of this study is to map the bibliometric landscape of the literature addressing psychological status in TMD between 2004 and 2024, and to identify research trends, the most influential publications, authors, countries.

**Materials and Methods:** The study's dataset was obtained from the WOS Core Collection database. After applying the specified exclusion criteria, 1272 articles and review articles published between 2004 and 2024 were included in the analysis. The bibliometric analysis was carried out using the VOSviewer software. Annual output, country productivity, co-authorship, citation patterns, and keyword co-occurrence were assessed.

**Results:** A significant increase in the number of publications was observed, particularly accelerating after 2014 and peaking in recent years. Ohrbach R., Lobbezoo F., and Svensson P. were at the center of research networks, while the most cited study was conducted by Schiffman E. and colleagues, who introduced the diagnostic criteria for TMD. While the USA held a quantitative lead in scientific output, a dynamic and multi-centered collaboration network also emerged, involving Italy, Brazil, and several European countries. Studies focusing on "diagnostic criteria" in the early stages have gradually given way to psychosocial and patient-centered themes such as "depression", "anxiety", "chronic pain" and "quality of life".

**Conclusion:** This study presents evidence-based findings through bibliometric analysis, highlighting an increase in scientific literature addressing the psychological status in TMD over the past 20 years. It identifies the most influential authors, publications, countries, international collaborations, and research trends. Recent TMD research trends suggest a shift towards a comprehensive biopsychosocial model emphasizing the prevention of disability.

**Keywords:** Anxiety, bibliometric analysis, depression, psychological stress, temporomandibular disorders

### INTRODUCTION

Temporomandibular disorders (TMD) are an umbrella term that encompasses a group of musculoskeletal and neuromuscular disorders characterized by clinical symptoms affecting the masticatory muscles, temporomandibular joint, and associated anatomical structures [1]. Although the etiology of TMD has long been attributed primarily to occlusal and mechanical factors, current scientific evidence strongly suggests that these approaches alone are insufficient, and the field is evolving towards a psychosocial model [2]. With its high prevalence in the general

population, TMD presents not only as an individual health issue but also as a significant public health problem. This condition can significantly reduce patients' quality of life and result in substantial socioeconomic costs [3].

Psychological factors, general joint and muscle disorders, and various chronic diseases can be underlying causes of TMD [4]. It is increasingly recognized that psychological conditions such as stress, anxiety, and depression can be both a trigger and a result of TMD symptoms [5]. For example, psychological stress can lead to an increase in parafunctional habits, such as bruxism, which causes

### CITATION

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excessive fatigue in the masticatory muscles and places abnormal loads on the joint. It can also affect pain perception and modulation pathways in the central nervous system, thereby lowering the patient's pain threshold [6]. A systematic review by Santos and colleagues suggests a significant association between anxiety and TMD [7]. Similarly, depression is more common and severe in patients with TMD, particularly those with the myofascial pain, and it contributes to both chronic nature of the pain experience and a reduction in the patient's quality of life [8]. Determinants of high pain-related disability are linked to psychosocial factors such as severe depression, somatization, chronic pain, and treatment-seeking behavior [9]. TMD severity has been shown to have significant relationships with jaw pain, neck disability, headache, anxiety, and sleep quality [10].

Findings of OPPERA (Orofacial Pain: Prospective Evaluation and Risk Assessment) studies suggest that psychological factors play a significant role in the development and severity of TMD [11-13]. The risk of developing first-onset TMD is significantly higher in individuals with high levels of psychological stress, anxiety, depression, and somatization. Psychological factors are a strong predictor of TMD onset [13]. Somatic and psychological symptoms emerged as a robust risk factor for TMD. Several psychological variables predicted increased risk of TMD, including reported somatic symptoms, psychosocial stress, and affective distress [11]. This situation demonstrates that the pain experience is shaped not only by peripheral factors but also by psychosocial processes. Findings from OPPERA's genetic studies have defined various disrupted biological pathways related to inflammation, pain processing and psychological function, suggesting that TMD should be regarded as a multisystem disorder rather than an isolated jaw or dental disorder [4,13].

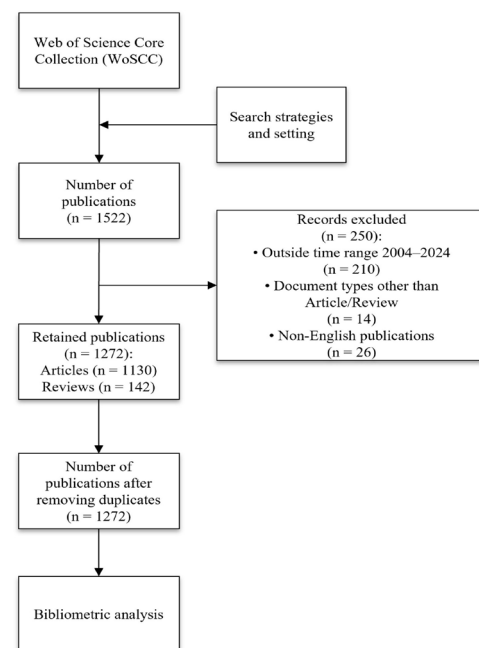
There are time-dependent changes in the biopsychosocial characteristics associated with TMD [12]. A bibliometric study on TMD has highlighted focus areas, including anatomical factors, symptoms, biopsychosocial factors, and epidemiology in TMD. Psychological factors such as depression, anxiety, and stress are among the prominent keywords [14]. However, the general trends of publications, influential authors, collaboration networks, and research trends in this field have not yet been comprehensively evaluated with bibliometric techniques. Bibliometric analyses are a powerful methodological tool for revealing the structural characteristics, global distribution, and development trends of studies on a specific topic [15,16]. In this context, understanding the development of scientific interaction between TMD and psychological status on a global scale is crucial for future research. Therefore, the present study aims to analyze the scientific literature on psychological state in TMD over the past 20 years using bibliometric methods, mapping global research trends, the most influential publications, authors, countries, and collaboration networks in this field.

## MATERIAL AND METHOD

The Web of Science Core Collection database, considered the gold standard for mapping scientific research due to its comprehensive and interdisciplinary nature, was used for data

collection. The search strategy was created by combining two sets of keywords with the Boolean operator "AND." The first set contained terms describing temporomandibular disorders [TS=("temporomandibular disorders" OR "temporomandibular disorder" OR "temporomandibular joint (TMJ) disorders" OR "temporomandibular joint (TMJ) disorder" OR "temporomandibular joint disorder" OR "temporomandibular joint disorders" OR "temporomandibular joints disorders" OR "craniomandibular disorders" OR "craniomandibular disorder" OR "myogenous TMDs" OR "myogenous TMD" OR "temporomandibular dysfunction" OR "temporomandibular joint disease" OR "temporomandibular joint diseases" OR "temporo-mandibular joint disorders" OR "temporomandibular joint dysfunction" OR "temporal mandibular disorder" OR "temporomandibular diseases" OR "temporomandibular dysfunctions" OR "TMJ disorders" OR "TMJ dysfunction" OR "TMJ syndrome"), while the second cluster included terms expressing psychological status [TS=("psychological stress" OR "anxiety" OR "depression" OR "psychological distress" OR "psychological health" OR "mood disorders" OR "psychological disorder" OR "psychological status" OR "psychological symptoms" OR "psychological assessment" OR "psychological well-being" OR "psychological profile" OR "psychological comorbidity")]

As a result of the comprehensive search, 1522 records were initially identified. These records underwent a systematic screening process based on exclusion criteria. First, publications outside the 2004–2024 time frame, which was the focus of the study, were excluded, resulting in a reduced number of publications to 1312. After selecting the document types "Article" and "Review Article" the number further reduced to 1298. After applying the language criterion of including only English publications, this number reduced to 1272 (Figure 1).



**Figure 1.** Flowchart for the search strategy and selection process of the bibliometric analysis

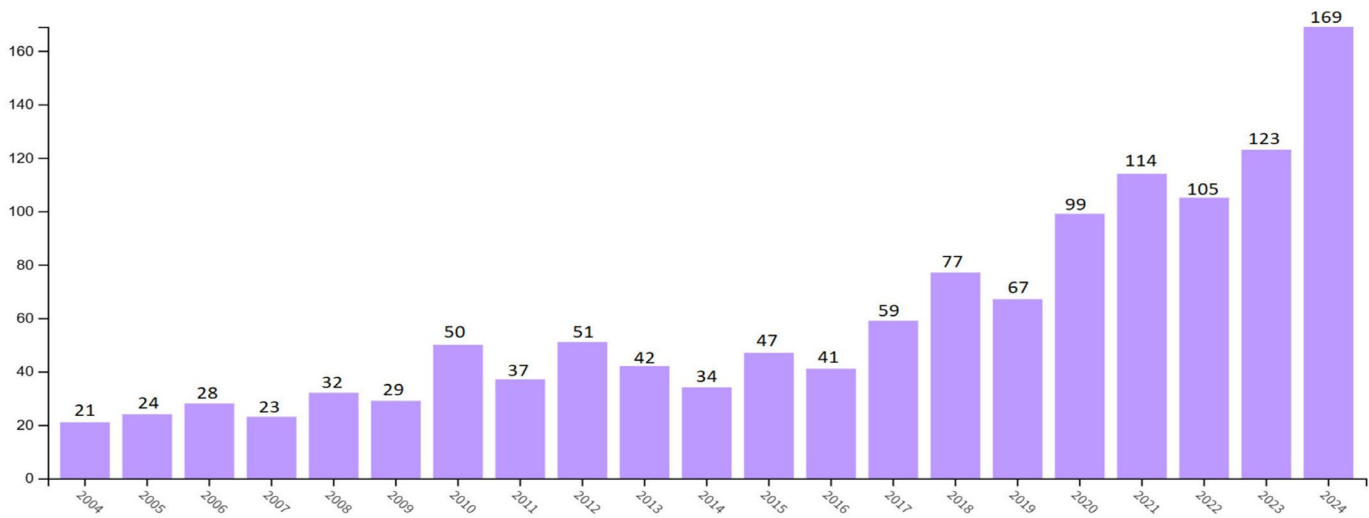
VOSviewer (version 1.6.20), a widely accepted software in the field, was used for data visualization and network analysis [17]. VOSviewer provides advanced capabilities for creating and visualizing bibliometric networks, enabling the mapping of complex relationships between bibliometric data, including authors, countries, institutions, and keywords. Using this software, annual output, country productivity, co-authorship, citation patterns, and author keyword co-occurrence were assessed. For all networks, node size denotes production (publications or occurrences), edge thickness represents relational strength (links or total link strength), and color encodes cluster membership. For the overlay map, color instead reflects the average publication year, thereby visualizing temporal shifts in topic prominence.

The bibliometric analysis utilized in our study was derived from publicly accessible the open-access Web of Science database. As

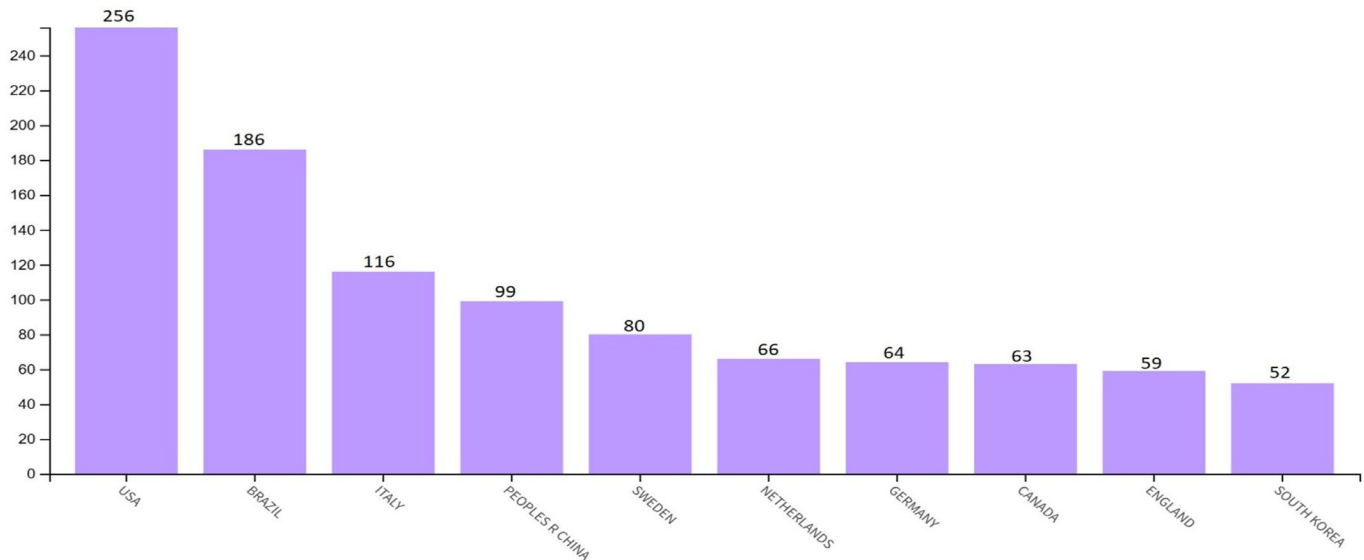
such, ethical committee approval was not required.

**RESULTS**

A total of 1272 studies examining the psychological status in TMD were identified. The annual publication count graph presented in Figure 2 reflects the psychological status in TMD and the increasing interest in this area between 2004 and 2024. Interest in the topic developed gradually during the first half of the twenty-year period analyzed (2004-2012). A clear turning point emerged in 2014, with the research area gaining acceleration. It was determined that the number of publications fluctuated over the last 10 years, peaking in the last two years. When evaluating the distribution of publications by country (Figure 3), the United States ranked first with 256 publications. The United States was followed by Brazil with 186 studies, Italy with 116 studies, and China with 99 studies.



**Figure 2.** The annual number of publications (2004-2024)



**Figure 3.** Top10 productive country

### Co-authorship of Authors

The analysis of author collaboration networks reveals the structure of scientific communities in a research field and the connections between key authors. The analysis performed with VOSviewer identifies the authors with the most collaboration and the highest total link strength, showing the authors at the center of research communities who direct the flow of information.

The analysis revealed that 4907 authors contributed to the psychological state in TMD. Among these authors, 112 authors

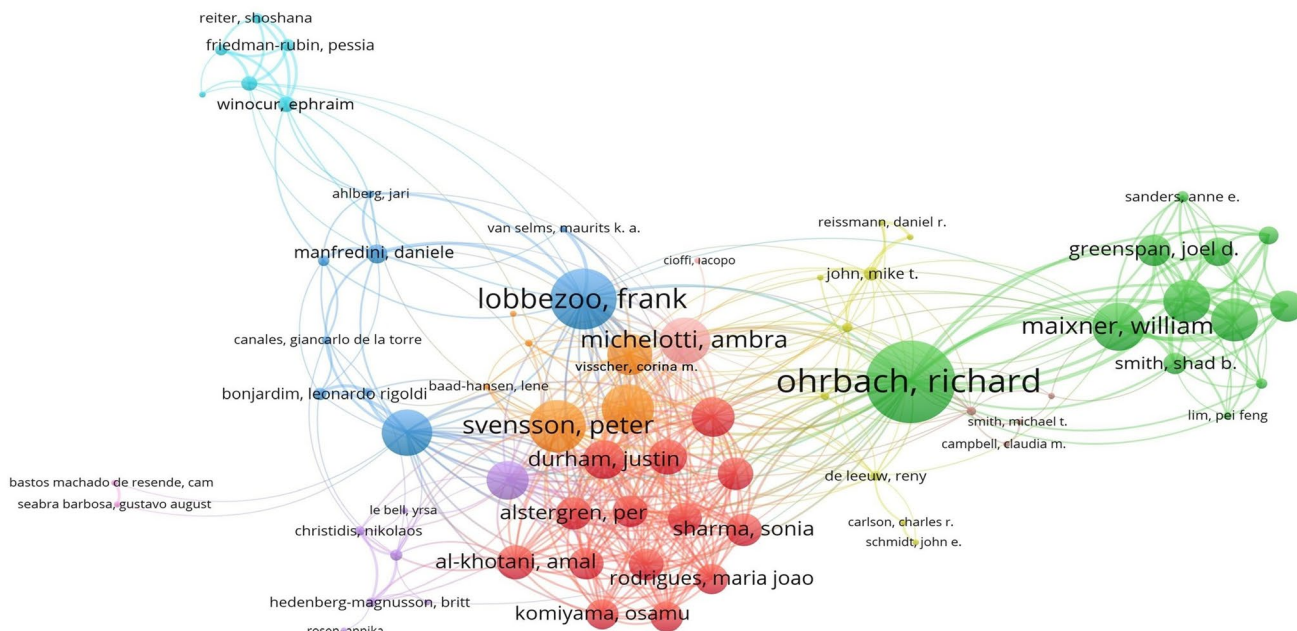
were identified who had conducted at least five studies and whose studies had been cited at least 5 times. Upon examining the dataset, it was observed that names such as Ohrbach R. (40 links, 168 total link strength), Lobbezoo F. (33 links, 124 total link strength), and Svensson P. (36 links, 107 total link strength) were at the center of the network in terms of both the links number and the link strength. These authors stood out as the most productive and collaborative researchers in the field. Following them, others such as List T., Maixner W., and Michelotti A. also established a significant number of collaborative networks (Table 1).

**Table 1.** Top 10 most collaborative authors in the field

| Authors            | Links | Total Link Strength | Documents | Citations |
|--------------------|-------|---------------------|-----------|-----------|
| Ohrbach R.         | 40    | 168                 | 31        | 4136      |
| Lobbezoo F.        | 33    | 124                 | 40        | 4233      |
| Svensson P.        | 36    | 107                 | 29        | 3722      |
| List T.            | 34    | 98                  | 16        | 3609      |
| Maixner W.         | 23    | 98                  | 24        | 4825      |
| Michelotti A.      | 33    | 94                  | 14        | 3128      |
| Rodrigues Conti P. | 29    | 94                  | 19        | 419       |
| Fillingim R.       | 11    | 87                  | 20        | 1652      |
| Slade G.           | 11    | 87                  | 18        | 1679      |
| Visscher C.        | 31    | 85                  | 22        | 3321      |

Upon visual examination of the collaboration map, the identified authors were divided into 10 distinct clusters (Figure 4). Distinct clusters, represented by different colors and concentrated around authors, were observed. The green cluster was seen to gather around Ohrbach R. and Maixner W. Similarly, the blue cluster gathered around authors such as Lobbezoo F.,

the orange cluster around Svensson P. and Visscher C., and the pink cluster around Michelotti A. The authors in the red cluster formed the largest cluster visible on the map, despite being unable to establish sufficient connections on their own. The co-author analysis revealed that the field has a highly linked structure, but it is clustered around several major clusters.



**Figure 4.** Collaboration network of productive authors

## Citations of Documents

Citation analysis of documents identifies the most influential and fundamental studies in a scientific field. This analysis highlights the documents with the highest number of citations, mapping important publications that form the theoretical basis of the field.

When examining these highly influential publications listed in Table 2, the most cited study in the field is the article "Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD)" published by Schiffman E. and colleagues in 2014

(2783 citations). Second on the list is the review titled "Bruxism physiology and pathology: an overview for clinicians" by Lavigne G. et al., published in 2008 (536 citations), and third is the publication titled "Painful Temporomandibular Disorder: Decade of Discovery from OPPERA Studies" (441 citations). These studies were followed by Turner J.'s "Mediators, moderators, and predictors of therapeutic change in cognitive-behavioral therapy for chronic pain" (389 citations) and Maixner W.'s publication titled "Overlapping Chronic Pain Conditions: Implications for Diagnosis and Classification" (377 citations).

**Table 2.** Top 10 most-cited documents in the field

| Rank | Author             | Title  | Journal                                    | Citations | Year |
|------|--------------------|--|--|-----------|------|
| 1    | Schiffman E. [18]  | Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) for Clinical and Research Applications: Recommendations of the International RDC/TMD Consortium Network and Orofacial Pain Special Interest Group | Journal of Oral & Facial Pain and Headache | 2783      | 2014 |
| 2    | Lavigne G. [19]    | Bruxism physiology and pathology: an overview for clinicians   | Journal of Oral Rehabilitation             | 536       | 2008 |
| 3    | Slade G. [4]       | Painful Temporomandibular Disorder: Decade of Discovery from OPPERA Studies  | Journal of Dental Research                 | 441       | 2016 |
| 4    | Turner A. [28]     | Mediators, moderators, and predictors of therapeutic change in cognitive-behavioral therapy for chronic pain   | Pain                                       | 389       | 2007 |
| 5    | Maixner W. [29]    | Overlapping Chronic Pain Conditions: Implications for Diagnosis and Classification   | Journal of Pain                            | 377       | 2016 |
| 6    | List T. [26]       | Temporomandibular disorders: Old ideas and new concepts  | Cephalalgia                                | 361       | 2017 |
| 7    | Manfredini D. [30] | Role of Psychosocial Factors in the Etiology of Bruxism  | Journal of Orofacial Pain                  | 340       | 2009 |
| 8    | Kucyi A. [31]      | Enhanced Medial Prefrontal-Default Mode Network Functional Connectivity in Chronic Pain and Its Association with Pain Rumination   | Journal of Neuroscience                    | 306       | 2014 |
| 9    | Diatchenko L. [32] | Idiopathic pain disorders- Pathways of vulnerability   | Pain                                       | 291       | 2006 |
| 10   | Bueno C. [33]      | Gender differences in temporomandibular disorders in adult populational studies: A systematic review and meta-analysis   | Journal of Oral Rehabilitation             | 278       | 2018 |

## Citations of Authors

Author citation analysis aims to identify the most influential authors in a research field, those frequently referenced in the literature. This analysis identifies authors with the highest number of citations and publications, highlighting the pioneers in the field and the magnitude of their contributions to the literature.

Among authors, 110 were identified who had published at least five papers and had had their papers cited at least five times. Upon

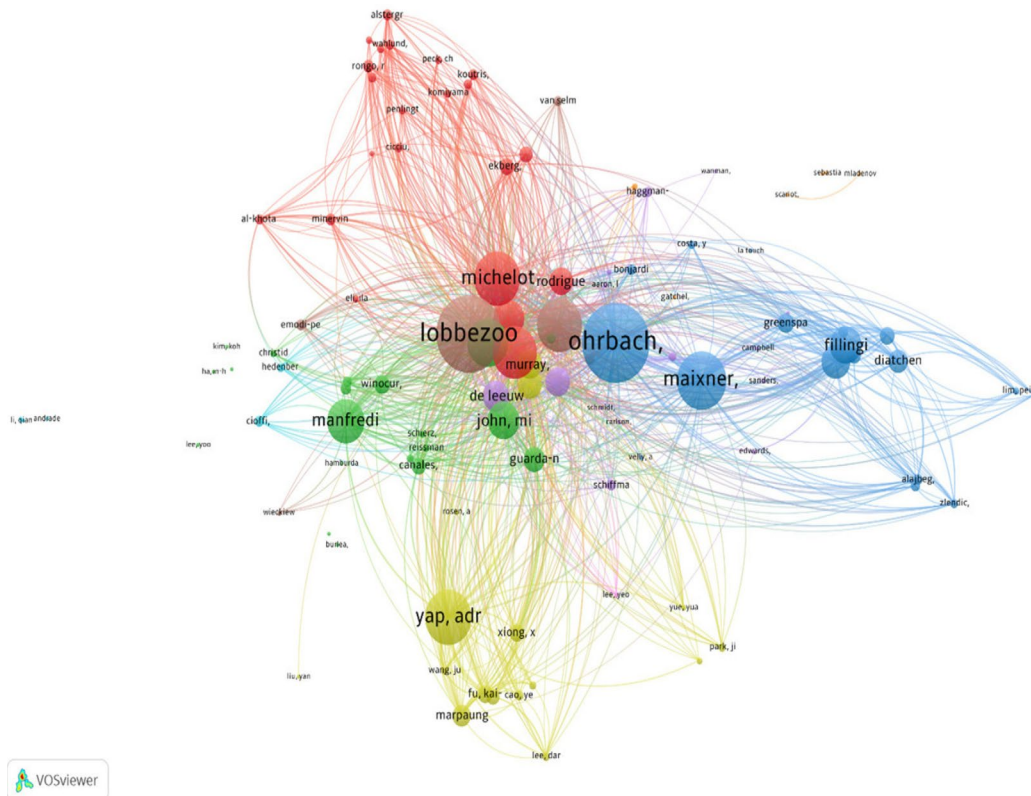
examination of the dataset, the 110 authors who contributed the most were Ohrbach R. (with a total link strength of 1443), Lobbezoo F. (1404 total link strength), and Maixner W. (1052 total link strength). Following them were Yap U. (993 total link strength), Michelotti A. (976 total link strength), Visscher C. (968 total link strength), List T. (946 total link strength), Svensson P. (873 total link strength), Manfredini D. (796 total link strength), and Fillingim R. (675 total link strength) were also among the top 10 most influential authors in the field (Table 3).

**Table 3.** Top 10 most-cited authors in the field

| Authors       | Links | Total Link Strength | Documents | Citations | Year |
|---------------|-------|---------------------|-----------|-----------|------|
| Ohrbach R.    | 102   | 1443                | 31        | 4136      | 2014 |
| Lobbezoo F.   | 103   | 1404                | 40        | 4233      | 2008 |
| Maixner W.    | 100   | 1052                | 24        | 4825      | 2016 |
| Yap U.        | 75    | 993                 | 33        | 310       | 2007 |
| Michelotti A. | 100   | 976                 | 14        | 3128      | 2016 |
| Visscher C.   | 99    | 968                 | 22        | 3321      | 2017 |
| List T.       | 100   | 946                 | 16        | 3609      | 2009 |
| Svensson P.   | 102   | 873                 | 29        | 3722      | 2014 |
| Manfredini D. | 93    | 796                 | 31        | 1457      | 2006 |
| Fillingim R.  | 85    | 675                 | 20        | 1652      | 2018 |

Upon examining the citation map, it was observed that these authors were positioned at the center of the network as large nodes, forming a dense citation network around them (Figure 5). In particular, the blue cluster, formed by Ohrbach R. and Maixner

W., and the red cluster, including Lobbezoo F. and Michelotti A., emerged as the two main scientific centers in the field. Additionally, Yap A.U. (yellow cluster) and Manfredini D. (green cluster) also contributed to the field, although not as much as the other authors.



**Figure 5.** Visualization network of citation links of authors

**Citations of Countries**

The citation analysis of countries visualizes the global distribution of scientific production and the impact of countries

in their respective research fields. This method identifies the countries with the most citations, revealing the centers of global knowledge production, the leading countries, and their respective contributions to the literature.

In the analysis of countries, 76 countries contributed to the field on psychological state in TMD. 42 countries conducted at least five studies in the field, and these countries received more than five citations. According to the analysis results, the US was found

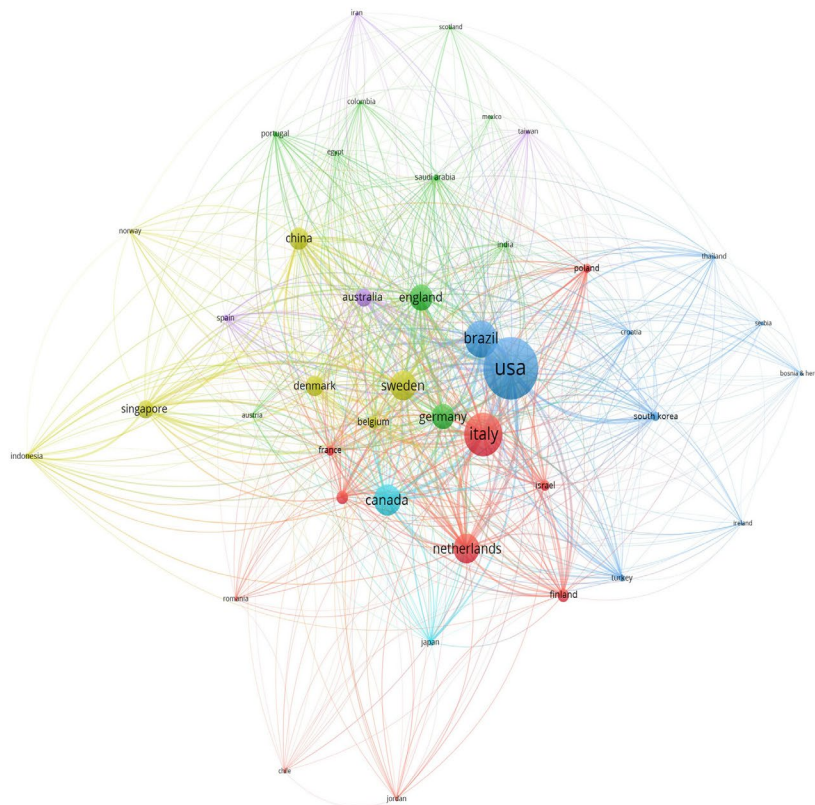
to be the leader in this field with 14077 citations. It was followed by Italy (6224 citations) and Brazil (3899 citations). Countries such as Canada, Sweden, and the Netherlands ranked after these three countries (Table 4).

**Table 4.** Top 10 most-cited countries in the field

| Countries   | Links | Total Link Strength | Documents | Citations | Year |
|-------------|-------|---------------------|-----------|-----------|------|
| USA         | 41    | 4033                | 256       | 14077     | 2014 |
| Italy       | 41    | 2835                | 116       | 6224      | 2008 |
| Brazil      | 41    | 2413                | 186       | 3899      | 2016 |
| Canada      | 41    | 2017                | 63        | 5629      | 2007 |
| Sweden      | 41    | 1936                | 80        | 4964      | 2016 |
| Netherlands | 40    | 1906                | 66        | 4924      | 2017 |
| England     | 41    | 1708                | 59        | 4852      | 2009 |
| Germany     | 41    | 1674                | 64        | 4720      | 2014 |
| China       | 41    | 1436                | 99        | 1313      | 2006 |
| Denmark     | 40    | 1358                | 41        | 4233      | 2018 |

When examining the citation network map (Figure 6), it was observed that the US (blue cluster) was located at the center of the network and had strong connections with many other countries. Different countries, such as Italy, the Netherlands (red cluster), Canada (turquoise cluster), the UK, and Germany (green cluster),

were seen to be clustered. This figure showed that the global flow of information in psychological state research in TMD is predominantly US-centered, but some European countries (Denmark, Sweden, Netherlands) also have strong connections in the networks.



**Figure 6.** Visualization network of citation links of countries

### Co-occurrence of Author Keywords

The analysis of author keyword co-occurrence determines the conceptual map of a research field and its fundamental research themes. Based on the frequency with which keywords appear together in the same documents, this analysis visualizes the main topics in the field, emerging trends, and intersections between different research areas, revealing the thematic structure of the information.

The analysis identified 2102 keywords. Forty of these keywords were used at least 15 times in the studies. According to the analysis, terms such as temporomandibular disorders (1415 total link strength), depression (543 total link strength), anxiety (502 total link strength), orofacial pain (292 total link strength), and stress (263 total link strength) emerged as the most frequently used keywords. The average years in which these keywords were most prominent were identified (Table 5).

Table 5. Top 10 keywords by the number of co-occurrences

| Keywords                    | Links | Total Link Strength | Occurrences | Average Publication Year | Year |
|-----------------------------|-------|---------------------|-------------|--------------------------|------|
| Temporomandibular Disorders | 90    | 1415                | 705         | 2018                     | 2014 |
| Depression                  | 80    | 543                 | 190         | 2017                     | 2008 |
| Anxiety                     | 78    | 502                 | 171         | 2018                     | 2016 |
| Orofacial pain              | 66    | 292                 | 117         | 2017                     | 2007 |
| Stress                      | 56    | 263                 | 87          | 2020                     | 2016 |
| Pain                        | 56    | 260                 | 109         | 2017                     | 2017 |
| Bruxism                     | 53    | 248                 | 109         | 2019                     | 2009 |
| Chronic Pain                | 58    | 217                 | 107         | 2017                     | 2014 |
| Temporomandibular Joint     | 48    | 150                 | 69          | 2017                     | 2006 |
| Quality of Life             | 40    | 119                 | 50          | 2019                     | 2018 |

Cluster analysis of the keyword network revealed that the field consists of distinct color clusters representing related but different areas of expertise (Figure 7). The yellow cluster consisted of terms such as bruxism, myofascial pain, and masticatory muscles. The green cluster consisted of keywords such as chronic pain, orofacial

pain, and headache, demonstrating the link between TMD and other chronic pain syndromes. Keywords such as anxiety, depression, quality of life, and stress formed the blue cluster. The red cluster consisted of keywords such as temporomandibular disorders, research diagnostic criteria, and epidemiology.

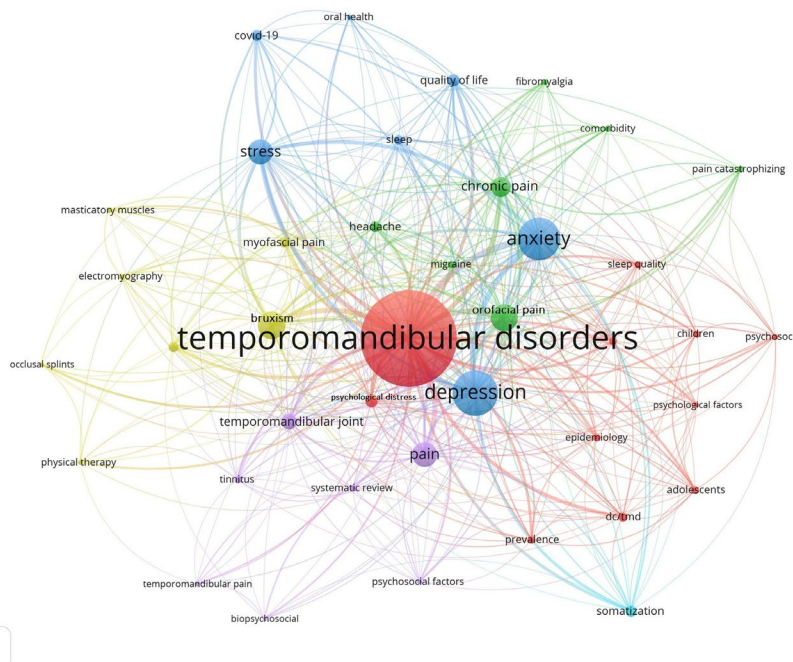


Figure 7. Visualization of the co-occurrence network of keywords



new evidence-based system. The study established international standards for the diagnosis and classification of TMD, resulting in the RDC/TMD system, which is suitable for both clinical and research purposes and has higher validity and reliability [18]. It has thus become the fundamental reference point in the field. Lavigne's article, "Bruxism physiology and pathology" provides clinicians with a comprehensive framework for understanding the pathophysiology of bruxism. Most subsequent studies have focused on pain mechanisms, psychosocial factors, and neurophysiological processes related to chronic pain. This demonstrates that the field is approached not only from a dental or temporomandibular joint perspective, but also through a multidisciplinary approach involving neurology, psychology, and pain science. From a bibliometric perspective, the most influential themes in the field revolve around the standardization of diagnostic criteria, understanding the mechanisms of bruxism and chronic pain, and examining psychosocial factors.

The fact that the most frequently used keywords after "temporomandibular disorders" in keyword analysis are "depression" and "anxiety" shows that psychological status is now part of TMD research. The prevalence of psychological disorders such as anxiety and depression in TMD patients is significantly higher than in the general population. This raises a frequently debated question in the field: Does psychological stress cause TMD, or do chronic pain and dysfunction cause these psychological conditions [22,23] Current evidence suggests that this relationship is not unidirectional but rather involves a reciprocal and cyclical interaction. Anxiety and depression can exacerbate existing TMD symptoms by lowering the pain threshold and disrupting pain modulation mechanisms, while the chronic pain, social isolation, and decline in quality of life associated with TMD also negatively affect an individual's mental health [7,8]. Therefore, the centralization of the keywords "depression" and "anxiety" in the keyword network serves as evidence for this bidirectional and complex relationship. Psychological and pain-related keywords such as depression, anxiety, orofacial pain, and stress indicate that psychosocial factors play an important role in the etiology and management of TMD and related pain disorders. Furthermore, the frequent repetition of concepts such as bruxism, chronic pain, and temporomandibular joint reflects that the studies encompass both biomechanical and neuropsychological dimensions.

Examining the change of keywords over time allows for an understanding of the distance the field has covered and the conceptual transformation it has undergone between 2004 and 2024. The overlay visualization map shows that in the early stages of the field, the focus was on fundamental and definitional concepts such as "myofascial pain", "diagnostic criteria TMD" and "epidemiology". However, over time, the shift in the map's colors toward warm tones, such as green and yellow, indicates a change in the research agenda. The centralization of concepts such as "chronic pain", "headache", "sleep" and "bruxism" indicates a phase in which the psychosocial model has taken

hold, recognizing that TMD is not just a local problem but a complex syndrome intertwined with chronic pain, sleep disorders, and parafunctional habits [24,25]. Current concepts, such as "COVID-19", "quality of life" and "oral health" which are visible in the hottest yellow areas of the map, indicate the field's newest research areas and future potential. The emergence of the term "COVID-19" demonstrates the field's sensitivity to global health crises and that the effects of pandemic-related stress on TMD are being investigated. Similarly, the prominence of concepts such as oral health, quality of life, and stress indicates that the focus of research is shifting from symptom management to a more holistic approach centered on the patient's well-being and quality of life. This time-dependent change highlights the need for researchers and clinicians to shift their attention from the mechanical dimension of pain to the patient's emotional and psychological world, thereby shaping treatment approaches according to this holistic perspective [26,27].

## CONCLUSION

In conclusion, this bibliometric study reveals that the literature addressing psychological status in TMD between 2004 and 2024 has undergone not only quantitative growth but also conceptual evolution. Findings suggest that TMD is shifting away from biomechanical and occlusal-based approaches and is being addressed within a multidisciplinary framework that also encompasses psychological processes. In particular, the centralization of the concepts of depression and anxiety in the keyword network shows that TMD is not just a local pathology but is closely related to the individual's psychological state, functionality, and quality of life. Approaches that center the biopsychosocial model in TMD research, which are holistic, patient-centered, and aimed at preventing pain-related disability, will shape future directions.

### Conflict of Interests

*The authors declare that there is no conflict of interest in the study.*

### Financial Disclosure

*The authors declare that they have received no financial support for the study.*

### Ethical Approval

*The bibliometric analysis utilized in our study was derived from publicly accessible the open-access Web of Science database. As such, obtaining approval from an ethics committee was deemed unnecessary.*

## References

1. Kapos FP, Exposto FG, Oyarzo JF, Durham J. Temporomandibular disorders: a review of current concepts in aetiology, diagnosis and management. *Oral Surg.* 2020;13:321-34.
2. González-Sánchez B, García Monterey P, Ramírez-Durán MV, et al. Temporomandibular joint dysfunctions: a systematic review of treatment approaches. *J Clin Med.* 2023;12:4156.
3. Valesan LF, Da-Cas CD, Réus JC, et al. Prevalence of temporomandibular joint disorders: a systematic review and meta-analysis. *Clin Oral Investig.* 2021;25:441-53.
4. Slade GD, Ohrbach R, Greenspan J, et al. Painful temporomandibular disorder: decade of discovery from OPPERA studies. *J Dent Res.* 2016;95:1084-92.

5. Liou YJ, Bai YM, Tsai SJ, et al. Bidirectional associations of temporomandibular joint disorders with major depressive and anxiety disorders. *J Evid Based Dent Pract.* 2023;23:101860.
6. Svensson P, Jadidi F, Arima T, et al. Relationships between craniofacial pain and bruxism. *J Oral Rehabil.* 2008;35:524-47.
7. Santos EA, Peinado BRR, Frazao DR, et al. Association between temporomandibular disorders and anxiety: a systematic review. *Front Psychiatry.* 2022;13:990430.
8. Reis PHF, Laxe LAC, Lacerda-Santos R, Münchow EA. Distribution of anxiety and depression among different subtypes of temporomandibular disorder: a systematic review and meta-analysis. *J Oral Rehabil.* 2022;49:754-67.
9. Manfredini D, Ahlberg J, Winocur E, et al. Correlation of RDC/TMD axis I diagnoses and axis II pain-related disability. A multicenter study. *Clin Oral Investig.* 2011;15:749-56.
10. Ünlüer NÖ, Sari YA, Bas SS. Temporomandibular dysfunction affects neck disability, headache, anxiety, and sleep quality in women: a cross-sectional study. *J Clin Pract Res.* 2023;45:456-62.
11. Fillingim RB, Ohrbach R, Greenspan JD, et al. Psychological factors associated with development of TMD: the OPPERA prospective cohort study. *J Pain.* 2013;14:T75-90.
12. Fillingim RB, Slade GD, Greenspan JD, et al. Long-term changes in biopsychosocial characteristics related to temporomandibular disorder: findings from the OPPERA study. *Pain.* 2018;159:2403-13.
13. Slade GD, Fillingim RB, Sanders AE, et al. Summary of findings from the OPPERA prospective cohort study of incidence of first-onset temporomandibular disorder: implications and future directions. *J Pain.* 2013;14:T116-24.
14. Bai B, Bai X, Wang C. Mapping research trends of temporomandibular disorders from 2010 to 2019: a bibliometric analysis. *J Oral Rehabil.* 2021;48:517-30.
15. Thompson D, Clark A. Measuring research success via bibliometrics: where they fit and how they help and hinder. *J Adv Nurs.* 2014;70:2699-701.
16. Ninkov A, Frank JR, Maggio LA. Bibliometrics: methods for studying academic publishing. *Perspect Med Educ.* 2022;11:173-6.
17. Van Eck NJ, Waltman L. Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics.* 2009;84:523-38.
18. Schiffman E, Ohrbach R, Truelove E, et al. Diagnostic criteria for temporomandibular disorders for clinical and research applications. *J Oral Facial Pain Headache.* 2014;28:6-27.
19. Lavigne G, Khoury S, Abe S, et al. Bruxism physiology and pathology: an overview for clinicians. *J Oral Rehabil.* 2008;35:476-94.
20. Al-Sharaee Y, Al-Moraissi EA, Christidis N, et al. Top 100 cited publications in the field of temporomandibular disorders: a bibliometric analysis. *Front Oral Health.* 2022;3:864519.
21. Dworkin SF, LeResche L. Research diagnostic criteria for temporomandibular disorders: review, criteria, examinations and classification, critique. *J Orofac Pain.* 1992;6:302-55.
22. Reiter S, Emodi-Perlman A, Goldsmith C, et al. Comorbidity between depression and anxiety in patients with temporomandibular disorders according to the research diagnostic criteria. *J Oral Facial Pain Headache.* 2015;29:135-43.
23. Kanehira H, Agariguchi A, Kato H, et al. Association between stress and temporomandibular disorder. *Nihon Hotetsu Shika Gakkai Zasshi.* 2008;52:375-80.
24. Adams LM, Turk DC. Psychosocial factors and central sensitivity syndromes. *Curr Rheumatol Rev.* 2015;11:96-108.
25. Zhong J, Gao X, Hu S, et al. Worldwide bibliometric analysis of research trends and hotspots of bruxism in adults during 1991–2021. *J Oral Rehabil.* 2024;51:5-14.
26. List T, Jensen RH. Temporomandibular disorders: old ideas and new concepts. *Cephalalgia.* 2017;37:692-704.
27. Suvinen TI, Reade PC, Kempainen P, et al. Review of aetiological concepts of temporomandibular pain disorders. *Eur J Pain.* 2005;9:613-33.
28. Turner JA, Holtzman S, Mancl L. Mediators, moderators, and predictors of therapeutic change in cognitive-behavioral therapy for chronic pain. *Pain.* 2007;127:276-86.
29. Maixner W, Fillingim RB, Williams DA, et al. Overlapping chronic pain conditions: implications for diagnosis and classification. *J Pain.* 2016;17:T93-107.
30. Manfredini D, Lobbezoo F. Role of psychosocial factors in the etiology of bruxism. *J Orofac Pain.* 2009;23:153-66.
31. Kucyi A, Moayedi M, Weissman-Fogel I, et al. Enhanced medial prefrontal-default mode network functional connectivity in chronic pain and its association with pain rumination. *J Neurosci.* 2014;34:3969-75.
32. Diatchenko L, Nackley AG, Slade GD, et al. Idiopathic pain disorders: pathways of vulnerability. *Pain.* 2006;123:226-30.
33. Bueno CH, Pereira DD, Pattussi MP, et al. Gender differences in temporomandibular disorders in adult population studies: a systematic review and meta-analysis. *J Oral Rehabil.* 2018;45:720-9.