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# Interdisciplinary Insights and Global Perspectives on ADHD in Children: A Comprehensive Bibliometric Analysis (2014–2024)

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**Abstract:** This study used bibliometric analysis to investigate the research on Attention-Deficit/Hyperactivity Disorder (ADHD) in pediatric populations between January 2014 and January 2024. The Scopus database is utilized to gather a diverse array of scholarly research on this complex ailment. Our objective was to compile a comprehensive dataset on understanding and managing ADHD by selecting specific terms such as "ADHD in Children", "ADHD Treatment and Management", and "Attention-Deficit/Hyperactivity Disorder". We utilized the advanced analytical capabilities of Biblioshiny (bibliometrix R-package) and VOSviewer (VOSviewer version 1.6.19), within our methodological framework, to do network analysis. By conducting this analysis, we were able to examine patterns in publications, author affiliations, the geographic spread of research, and identify influential texts and developing research topics. The findings underscore the collaborative endeavors of medicine, psychology, and neuroscience in tackling the physiological and psychological aspects of ADHD, with a focus on interdisciplinary contributions. The extensive global impact of ADHD research is highlighted by the significant contributions made by countries including the United States, China, the UK, the Netherlands, and Canada. Our data indicates a notable shift towards holistic strategies that encompass socioeconomic, environmental, and behavioral aspects, alongside emerging practices like the utilization of non-invasive brain stimulation techniques in research. This bibliometric study offers a comprehensive view of ADHD research by identifying significant patterns and clusters of themes. It illuminates the shifts in scientific conversation over time and identifies areas that show potential for additional research. The study advocates for ongoing collaboration across various disciplines and nations, emphasizing the significance of innovative strategies to enhance the well-being of those affected by ADHD.

**Keywords:** ADHD; children; pediatric ADHD treatment; bibliometric analysis; ADHD comorbidity; non-pharmacological interventions; VOSviewer analysis

## 1. Introduction

ADHD research in pediatric populations is a multifaceted field, with various studies shedding light on different aspects of the disorder. While some studies focus on prevalence rates and associated conditions, ADHD is frequently associated with comorbid psychiatric diseases, complicating its recognition and management, with a prevalence of 2.5% in the general adult population [1]. Studies have investigated the prevalence of adult ADHD in psychiatric populations, shedding light on the challenges and implications of this condition [2]. In non-psychotic adult psychiatric care, the prevalence of ADHD was found to

be 15.3%, indicating a significant portion of the outpatient psychiatric population being affected by ADHD [3]. These findings underscore the importance of understanding the prevalence and associated conditions of ADHD in different populations to enhance clinical interventions and support strategies. Other studies delve into the impact of ADHD on specific health outcomes such as head injuries [4,5] and hospitalizations [6]. The identification of unmet needs in children with ADHD has gained increasing importance in clinical research. Studies have highlighted various gaps in addressing the challenges faced by children and adolescents with ADHD. Research has demonstrated that children with ADHD are at a significantly higher risk of developing substance use disorders compared to those without ADHD, emphasizing the necessity for targeted interventions to address this vulnerability [7,8]. The prevalence and comorbidity of ADHD significantly enhance our understanding of the disorder. Willcutt (2012) [9] notes that ADHD prevalence rates vary globally, with diagnostic criteria accounting for regional differences rather than inherent variations between countries. Polanczyk et al. (2007) [10] suggest that prevalence in Europe may be lower than in North America, emphasizing the need to consider geographical factors in assessing ADHD's global impact. Moreover, ADHD's comorbidity with both psychiatric and physical disorders complicates clinical management [11]. Specifically, ADHD and epilepsy comorbidity in children creates complex treatment and medication challenges [12]. The prevalence of ADHD among children with epilepsy in high-income countries exceeds the global pooled prevalence, highlighting the significant role of comorbidities in ADHD's clinical manifestation [12]. The impact of ADHD on injury risks has been extensively researched, with studies indicating that individuals with ADHD may have an increased risk of injuries necessitating hospitalization [13]. There is also a discussion on the potential preventive effects of medication in reducing this risk. Research on the quality of life of children with ADHD has shown compromised quality of life across various domains [14]. Studies have explored the potential of non-invasive brain stimulation techniques, such as transcranial magnetic stimulation and transcranial direct current stimulation, in addressing the limitations associated with traditional treatment approaches for pediatric ADHD [15]. These methods are considered a means to modulate maladaptive thought patterns and potentially improve cognitive functions in individuals with ADHD [16]. Investigations into the relationship between ADHD and other psychiatric disorders, as well as congenital conditions, have provided insights into the etiologic subtypes of ADHD through brain imaging, genetic factors, and environmental influences [17]. This approach contributes to a deeper understanding of the disorder and its interactions with various comorbidities. Furthermore, emerging research is exploring novel areas such as the role of the gut microbiome in ADHD pathophysiology [18] and the genetic links between ADHD and bipolar disorder [19]. While some studies highlight the challenges in diagnosing and treating ADHD, such as issues with adherence to prescribing guidelines [20], others focus on the physiological aspects of the disorder, like cortical arousal [21]. Overall, the diverse range of studies underscores the complexity of ADHD in pediatric populations and the need for comprehensive approaches that consider various factors influencing the disorder.

The landscape of attention deficit hyperactivity disorder (ADHD) research in pediatric populations is extensive and diverse, covering areas such as diagnosis, management, and the impact of ADHD on children and their families. Studies have investigated the prevalence of ADHD, with research indicating a high prevalence rate in the general pediatric population [22]. Additionally, research has explored the self-perceptions of children with ADHD, revealing a positive illusory bias in how these children perceive their own competence [23]. Furthermore, studies have examined the role of parenting in the development of comorbidities and functional impairments in children with ADHD, emphasizing the significance of parenting characteristics in families with children diagnosed with ADHD [24]. Moreover, research has highlighted additional dimensions of ADHD, such as sensory over-responsivity, which can further impact individuals with ADHD [25]. The comorbidity of ADHD with substance use disorder in adolescents has also been a subject of research, underscoring the necessity for tailored treatments for this specific population [26]. Further-

more, investigations have explored the effects of physical activity on ADHD symptoms, suggesting that children with ADHD may derive cognitive benefits from physical activity [27]. In addition to clinical aspects, research has delved into the cognitive and literacy difficulties commonly experienced by children with ADHD, emphasizing the need for targeted interventions to support these individuals [28]. Furthermore, studies have examined the relationship between ADHD and obesity, highlighting the high prevalence and impact of both conditions on children's well-being [29]. Innovative approaches like transcranial direct current stimulation have also been explored as potential interventions to address the unmet needs in children with ADHD [30]. Overall, the extensive body of literature on ADHD in pediatric populations underscores the complexity of the disorder and the diverse factors that influence its diagnosis, management, and outcomes. Researchers and clinicians navigating this landscape must consider the wide array of studies that contribute to the understanding of ADHD and its implications for children and families.

A bibliometric analysis of ADHD research in children can provide a comprehensive overview of the scientific landscape surrounding the disorder. By quantitatively analyzing publication patterns, citation networks, and research trends, bibliometrics can offer valuable insights into the evolution of the field, key contributors, and emerging topics [31]. This approach can help identify influential studies and authors, uncover interconnections between various subfields, and highlight potential gaps in the literature [32]. Moreover, a bibliometric study can assess the global impact of research on pediatric ADHD, elucidating geographical and institutional contributions to the field [33]. Through bibliometric analysis, researchers can gain a macroscopic view of the ADHD research domain, facilitating a better understanding of the current state of knowledge and areas for future exploration [34]. Such analyses have been successfully applied in various fields, including pediatric trauma [32], child maltreatment [33], co-occurrence of autism and ADHD [34], and pediatric anesthesia [35]. These studies demonstrate the utility of bibliometrics in mapping research trends, identifying research gaps, and informing future research directions in the field of pediatric ADHD.

This study used bibliometric analysis to investigate the research on Attention-Deficit/Hyperactivity Disorder (ADHD) in pediatric populations to compile a comprehensive dataset on understanding and managing ADHD by selecting specific terms such as "ADHD in Children", "ADHD Treatment and Management", and "Attention-Deficit/Hyperactivity Disorder". The Scopus database is utilized to gather a diverse array of scholarly research on this complex ailment.

## 2. Methodology

This study utilized a bibliometric analysis of ADHD research in children. The below-listed diagram outlines a bibliometric study on ADHD using the SCOPUS database, from selecting keywords and documents to analyzing data with BiblioShiny and VOSviewer, focusing on citation and collaboration networks from 2014 to 2024 (Figure 1).
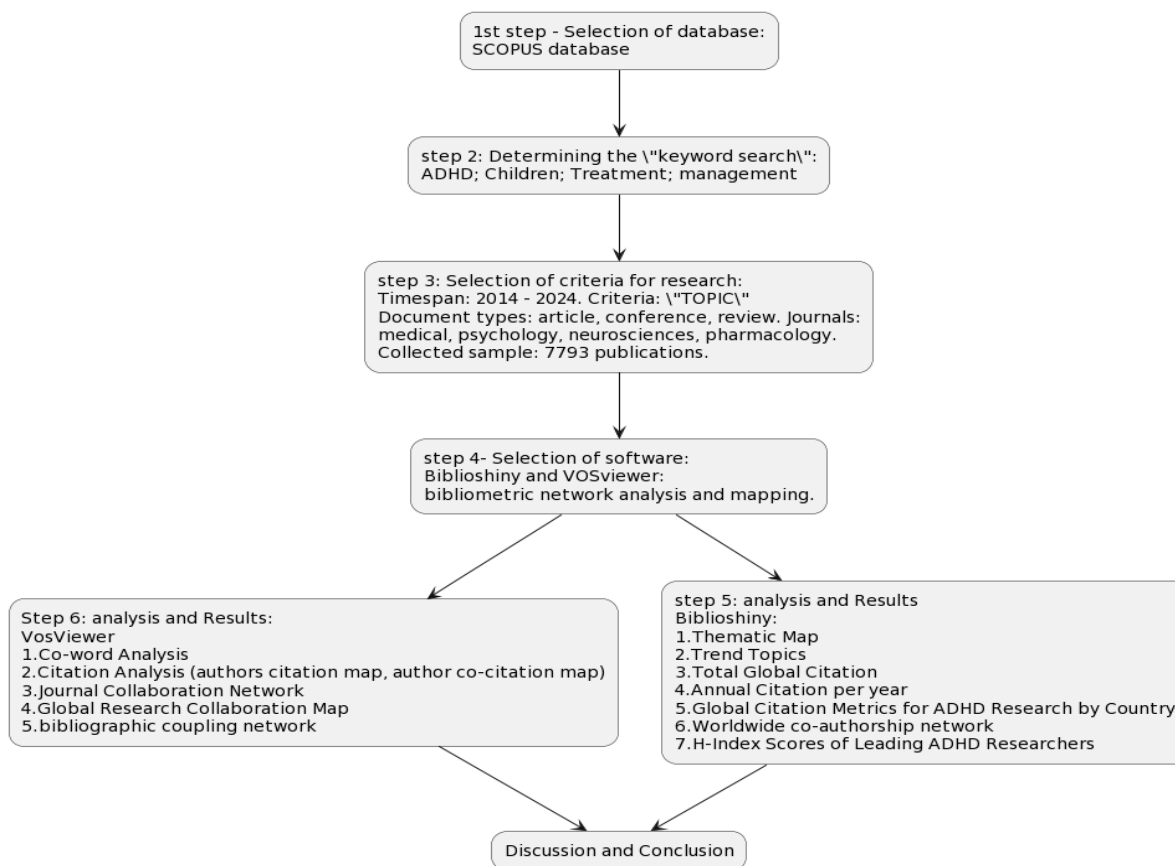
**Figure 1.** Workflow chart illustrates steps for bibliometric analysis to investigate the research on Attention-Deficit/Hyperactivity Disorder (ADHD).

## *2.1. Database and Searching*

### 2.1.1. Database Selection and Research Timeline

Our research into Attention-Deficit/Hyperactivity Disorder (ADHD) in children commenced with a comprehensive literature review, utilizing the Scopus database as our primary source of scholarly articles. The time frame for this search was strategically set from January 2014 to January 2024. This period was chosen to encapsulate a decade of significant advancements and milestones in the field of ADHD research, ensuring our study was grounded in the latest scientific findings and perspectives (Table 1).

**Table 1.** Main information about data.

| Description | Results |
|---|---|
| Main Information about Data | |
| Timespan | 2014–2024 |
| Sources (Journals, Books, etc.) | 1861 |
| Documents | 7715 |
| Annual Growth Rate % | −14.22 |
| Document Average Age | 5.13 |
| Average citations per doc | 18.12 |
| References | 0 |
| Document Contents | |

**Table 1.** *Cont.*

| Description | Results |
|---|---|
| Keywords Plus (ID) | 20,695 |
| Author's Keywords (DE) | 11,343 |
| AUTHORS | |
| Authors | 31,099 |
| Authors of single-authored docs | 318 |
| Authors Collaboration | |
| Single-authored docs | 345 |
| Co-Authors per Doc | 6.19 |
| International co-authorships % | 23.78 |
| Document Types | |
| Article | 6252 |
| Article article | 50 |
| Article conference paper | 1 |
| Article review | 15 |
| Conference paper | 78 |
| Review | 1308 |
| Review article | 6 |
| Review review | 5 |

### 2.1.2. Search Strategy and Keyword Selection

The foundation of our literature search was the careful selection of specific keywords and phrases to capture the most relevant studies. Terms such as "Attention-Deficit/Hyperactivity Disorder", "ADHD in Children", and "ADHD Treatment and Management" were employed. These phrases were chosen for their direct relevance to our research focus and their prevalence in the academic discourse surrounding ADHD.

Utilizing the "TOPIC" function within the Scopus database, we refined our search to prioritize articles where our selected keywords appeared in titles, abstracts, and bibliographies. This method ensured a high level of specificity and relevance in the results obtained. Additionally, the "keyword plus" feature was leveraged to expand our search horizon, capturing articles that, while not directly listed under our initial search terms, were nonetheless pertinent to our study through their association with closely related topics.

### 2.1.3. Screening and Analysis

Our search yielded a vast array of articles spanning several disciplines, including child psychiatry and pediatric neurology, which were pertinent to our investigation. Each article was meticulously screened to ensure it met our criteria for relevance, particularly focusing on studies conducted in English. This linguistic limitation was imposed to maintain consistency in our analysis and to ensure the integrity of our findings.

In addition to identifying relevant articles, a citation analysis was conducted. This allowed us to highlight the most influential contributions to the field, tracing the evolution of ADHD research over the past decade and identifying key figures and milestones that have shaped the current understanding of ADHD in children.

### 2.1.4. Contribution to the Field

Through this rigorous research methodology, we successfully compiled an extensive literature base on ADHD in children. Our approach, characterized by meticulous keyword selection, strategic use of database functions, and thorough screening for relevance, has

not only enabled us to capture the latest breakthroughs and insights but also to contribute significantly to the existing body of knowledge. The process outlined above has laid a solid foundation for our inquiry into ADHD, ensuring that our research is both comprehensive and aligned with the forefront of scientific exploration in this crucial area of study.

### 2.2. Dataset Analysis and Visualization

#### 2.2.1. Utilizing Biblioshiny for Advanced Bibliometric Insights

To enhance our bibliometric analysis of ADHD research, we integrated the use of biblioshiny [36] alongside VOSviewer. Biblioshiny, a dynamic interface for bibliometric analysis, allowed us to explore several key dimensions of the research landscape. It enabled the examination of trends in publication numbers over time, highlighting a significant increase in research activity that reflects the field's expanding academic and clinical focus. This tool also facilitated an exploration of authors' affiliations and the geographical distribution of research efforts, shedding light on the global landscape of ADHD studies. Through citation analysis, biblioshiny helped us identify the most influential documents in ADHD research, while the creation of a thematic map offered a visual overview of the main research areas and emerging trends. This comprehensive approach provided a holistic view of the ADHD research landscape, combining insights into publication trends, geographical contributions, citation impacts, and thematic orientations.

#### 2.2.2. Utilizing VOSviewer for Network Analysis

We also employed VOSviewer [37], renowned for its advanced network analysis capabilities and described as a tool for the "mapping of science". This software specializes in creating distance-based bibliometric maps to depict the strength of relationships between concepts, with closer proximity indicating stronger connections. VOSviewer's methodology was pivotal for unveiling clusters of interconnected research, thereby enhancing our understanding of the ADHD research structure and dynamics. The tool was instrumental in simplifying analyses of keyword co-occurrences, co-citations, and co-authorships, which are crucial for identifying the core themes and trends within the literature [37].

#### 2.2.3. Comprehensive Literature Search and Data Inclusion

A foundational element of our bibliometric analysis was an extensive literature search within the Scopus database, targeting a broad spectrum of works related to ADHD. Our selection criteria focused on relevance and quality, leading to the identification of 7715 documents, predominantly articles. This collection underscores the extensive academic interest in ADHD, reflecting the vast scope of research within this domain.

#### 2.2.4. Interdisciplinary Contributions and Temporal Trends

Our dataset analysis revealed that the majority of studies fall under the 'Medicine' category, with significant contributions from 'Psychology' and 'Neuroscience'. This interdisciplinary nature highlights the complex approach required to understand ADHD. A temporal examination of the literature showed a marked increase in focus on ADHD over time, with a notable surge in recent publications, indicating the dynamic evolution of ADHD research.

#### 2.2.5. Enhancing Understanding through Visualization

By applying both biblioshiny and VOSviewer for our bibliometric analysis, we navigated the extensive body of literature and visually mapped the intricate web of knowledge surrounding ADHD. This approach facilitated an intuitive understanding of the connections and clusters within the field, illustrating pivotal areas of study and the evolving research landscape. Through this analytical and visual exploration, we gained invaluable insights into the developments and collaborative efforts shaping ADHD research.

### 3. Results

The findings are divided into two sections: firstly, a description of the keyword search sample is presented, and secondly, the focus is on the biblioshiny analysis and VOSviewer bibliometric maps.

#### 3.1. Keywords Search

The keyword search performed on 20 March 2024, yielded a grand total of 7715 publications. Out of the 7715 publications, 6374 (82.62%) are empirical articles, 1340 (16.37%) are literature reviews, one (0.013%) is a conference article, 15 (0.19%) are article reviews, 6 (0.08%) are presented as article reviews, and finally 5 (0.065%) are review reviews.

#### 3.2. Trends in Publication Numbers over Time

The picture illustrates a bibliometric analysis of citations pertaining to research on ADHD from 2014 to 2024, covering a period of ten years (Table 2). This is a notable advancement in the scholarly involvement in ADHD research, as assessed by two separate measures: the average number of citations per article (MTC/Art) and the average total citations per year (MTC/Year) (Figure 2). In 2014, there was a significant amount of citation activity in the discipline, with an average of 36.59 citations each year. This indicates a strong interest in research output. Nevertheless, in the following years, there has been a substantial decline in citation metrics. The average number of citations per item steadily rose until 2019, peaking at a maximum of 3.43. However, it thereafter experienced a significant decrease, reaching a minimum value of 0.31 by the year 2024. Following an early increase in 2014, the average annual number of citations consistently declined, eventually reaching a final count of 4.07 citations by 2024. The decreasing trend in the citation frequency of research linked to ADHD indicates a potential decline in the production of impactful research in this field or a change in the research environment that affects how ADHD studies are mentioned in academic literature. The year 2014 is widely recognized as having the highest amount of citations, suggesting a time when ADHD research received substantial attention and involvement.

**Table 2.** Average Citations Per Year.

| Year | MTC/Art | MTC/Year | No. Articles |
|---|---|---|---|
| 2014 | 36.59 | 3.33 | 723 |
| 2015 | 32.18 | 3.22 | 641 |
| 2016 | 28.65 | 3.18 | 666 |
| 2017 | 23.45 | 2.93 | 698 |
| 2018 | 24.03 | 3.43 | 700 |
| 2019 | 18.27 | 3.04 | 749 |
| 2020 | 13.44 | 2.69 | 791 |
| 2021 | 8.51 | 2.13 | 894 |
| 2022 | 5.94 | 1.98 | 853 |
| 2023 | 4.07 | 2.04 | 844 |
| 2024 | 0.31 | 0.31 | 156 |

(MTC/Art): The average number of citations per article. (MTC/Year): The average total citations per year.
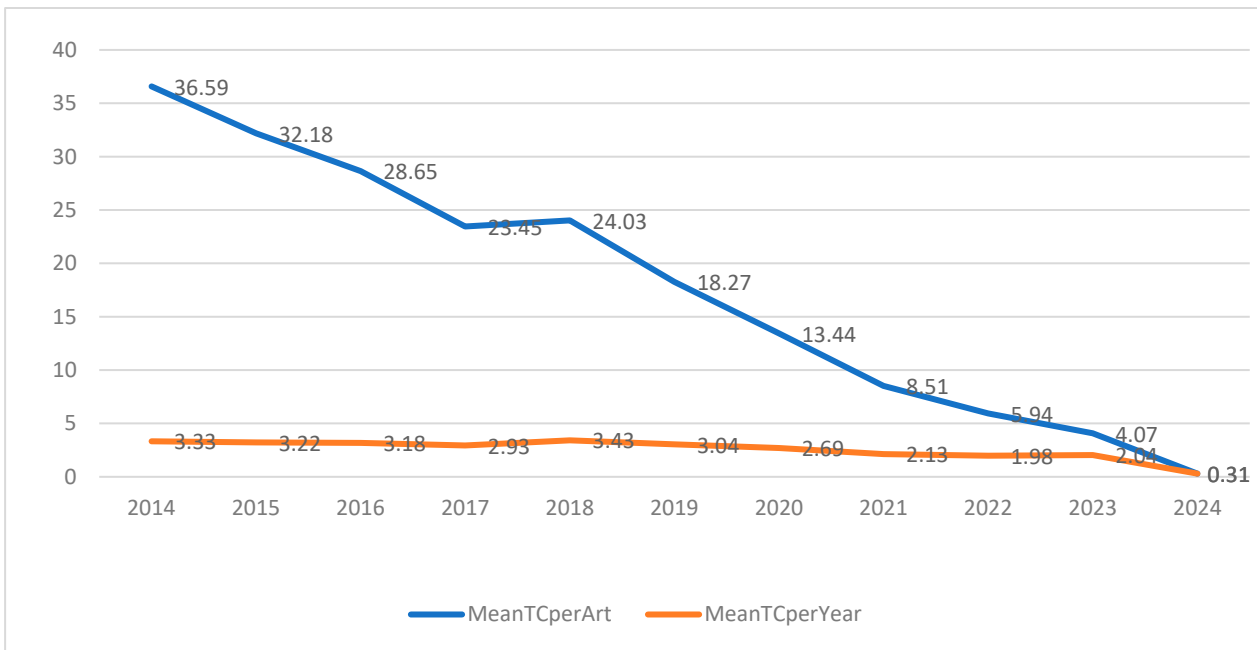
**Figure 2.** Trend of Average Citations for Articles Over Time. Declining trend in average citations per article and per year from 2014 to 2024, with a notable peak at the start of the period. The trend suggests a shift in research impact or emerging areas over the decade.

*3.3. Authors Affiliation and Countries Production*

The stacked bar charts illustrate the level of research production focused on the treatment and management of ADHD in children during a ten-year period, from 2014 to 2024. The data are classified according to the institutional and country affiliations, as shown in Figures 3 and 4. Esteemed establishments like the University of California and the University of Toronto have made significant contributions, showcasing remarkable growth throughout time (Figure 3). The United States is the foremost nation in terms of scholarly production at a national level, with notable contributions from the UK, the Netherlands, and Canada (Figure 4). These visualizations demonstrate a growing worldwide emphasis on ADHD research, suggesting a collaborative endeavor to enhance methods of managing this condition in children.
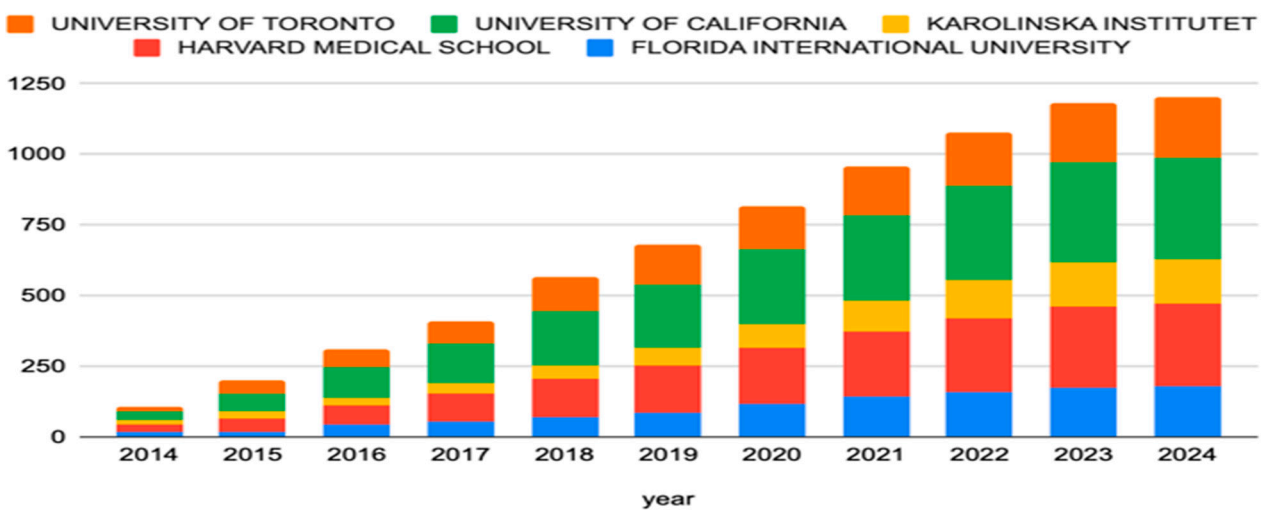


**Figure 3.** Institutional Research Publications Growth from 2014 to 2024. This chart displays the growing volume of research publications by year from key institutions, indicating a trend of increasing scholarly output in the observed period.
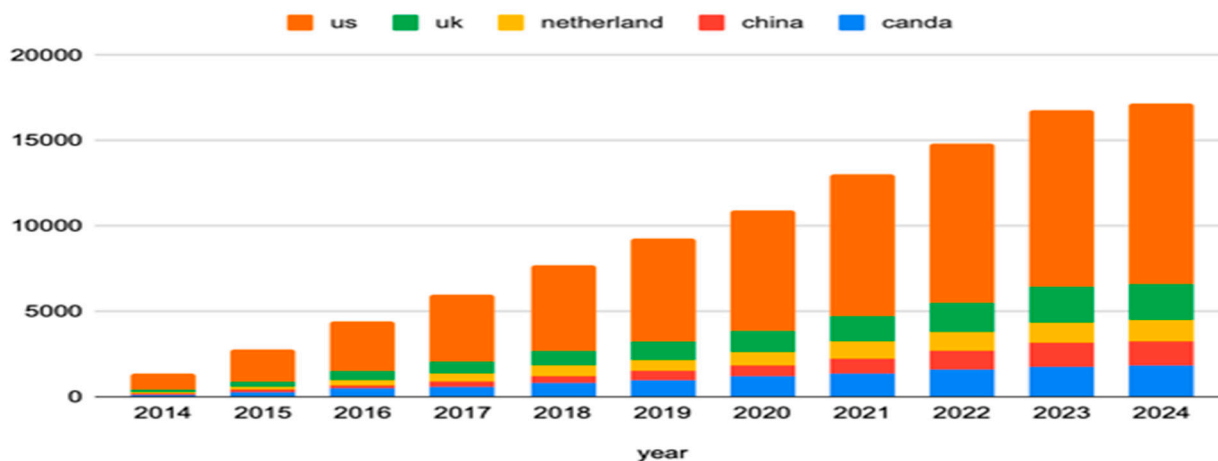
**Figure 4.** Comparative Annual Research Output by Country. The stacked bar chart showcases the annual research output from 2014 to 2024 across five countries, with the United States of America's contribution increasing significantly over the period.

*3.4. Most Global Cited Documents*

The pie chart (Figure 5) presents total citations (TCs) per year for various scientific studies or publications related to a specific field (possibly ADHD or psychiatry, given the previous context). Each slice of the pie chart corresponds to a particular study or publication, with its size proportional to the total number of citations that study received. The percentage next to each publication indicates the relative share of total citations it holds compared to the others. The bibliometric analysis of ADHD research from 2001 to 2014 highlights several influential studies. The most cited work is Zearah SA, 2023, published in Annu Int Conf Emerg R, accounting for 13.9% of total citations, followed by Polanczyk GV, 2014 (Int J Epidemiol) with 7.6%, and NA, 2022 (Lancet Psychiatry) with 7.5%. These studies have significantly impacted the field, likely due to their focus on emerging issues and novel insights into ADHD. Mid-level contributions include Visser SN, 2014 (J Am Acad Child Adolesc Psychiatry) and Faraone SV, 2015 (Nat Rev Disease Prim), each with 6.1% of citations, indicating their critical role in pediatric and neurobiological ADHD research. Notable works from Danielson ML, 2018 (J Clin Child Adolesc Psychiatry) and Thapar A, 2016 (Lancet) also contribute significantly, holding 4.7% and 4.3%, respectively, reflecting the importance of clinical and epidemiological studies in the field. Other key publications include Hyman SL, 2020 (Pediatrics), Wolraich ML, 2019, and Cortese S, 2018 (Lancet Psychiatry), each with around 4% of total citations. These findings underscore the significance of pediatric and psychiatric research in ADHD. Overall, the analysis reveals that a small group of highly cited studies has shaped ADHD research across multiple disciplines, with both recent and older works contributing to the evolving understanding of the disorder.

This figure illustrates a pie chart that provides a breakdown of the distribution of total citations and citations per year for important articles in the area, maybe relevant to pediatric psychology and psychiatry. The size of each segment corresponds to the number of citations that a specific text has received, which indicates its influence and popularity among the academic community. The figure is color-coded to distinguish between the documents and visually depict their citation metrics.
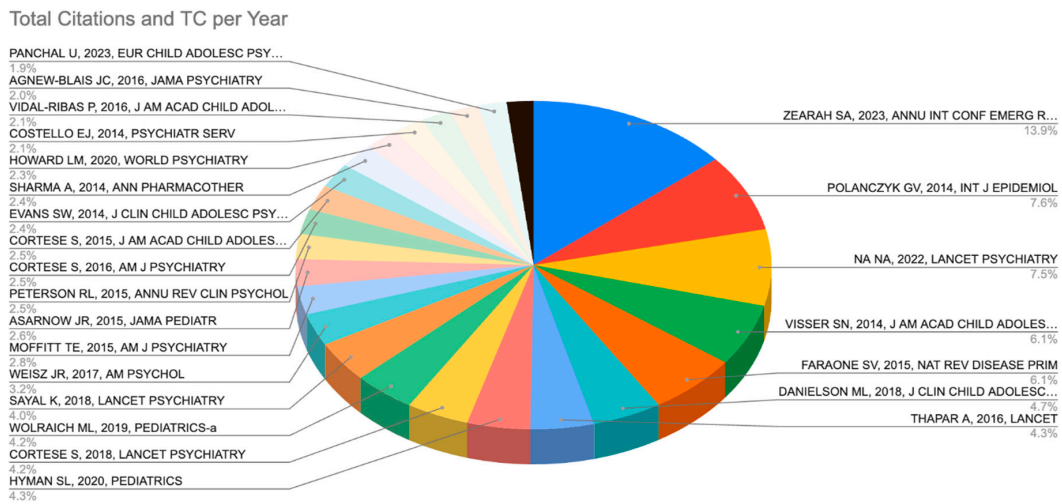
Total Citations and TC per Year



**Figure 5.** The Most Global Cited Documents.

*3.5. Thematic Map*

An essential aspect of comprehending the field of ADHD management and treatment literature is the careful identification and analysis of the primary topics and their interconnections. The analysis demonstrates a distinct pattern in the study themes (Figure 6), with the Basic Themes quadrant focusing on the humanistic and developmental elements of ADHD, specifically the effects on children and broader human behavior. The literature emphasizes the importance of individual and demographic factors in the management of ADHD. Meanwhile, the Niche Themes quadrant indicates a rising interest in the interaction between ADHD and other developmental disorders, indicating a promising field of research focused on holistic treatment approaches. In addition, the quadrant that represents emerging or declining themes identifies promising or diminishing areas of study, such as the effectiveness and safety of ADHD therapies and their associated side effects, such as headaches. This highlights unexplored possibilities for novel research.
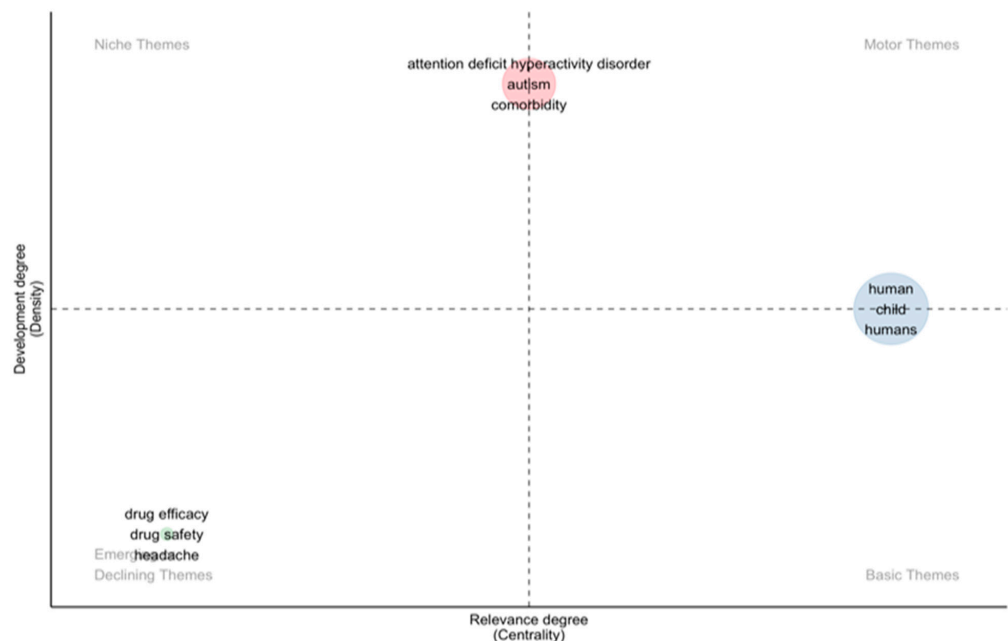


**Figure 6.** Thematic analysis of ADHD research. This scatter plot categorizes ADHD research themes by centrality and density, highlighting 'attention deficit hyperactivity disorder', 'autism', and 'comorbidity' as central and dense, indicating well-developed and pivotal research areas.

### 3.6. Bibliometric Maps

The subsequent part showcases the VOSviewer bibliometric maps derived from the examination of bibliographic reference coupling (see Figure 7 and Tables A1–A4 in Appendix A) and the analysis of keyword cooccurrence networks (see Figure 8 and Tables A5 and A6 in Appendix B). The study encompassed a sample size of 7715 academic articles published from 2014 to 2024. The two maps underwent sequential processing from 2014 to 2024 (refer to Figures 7 and 8). The color gradation represents the average date of co-occurrence of the terms for the first mentioned item, and for the second mentioned item, it represents the year of publication.
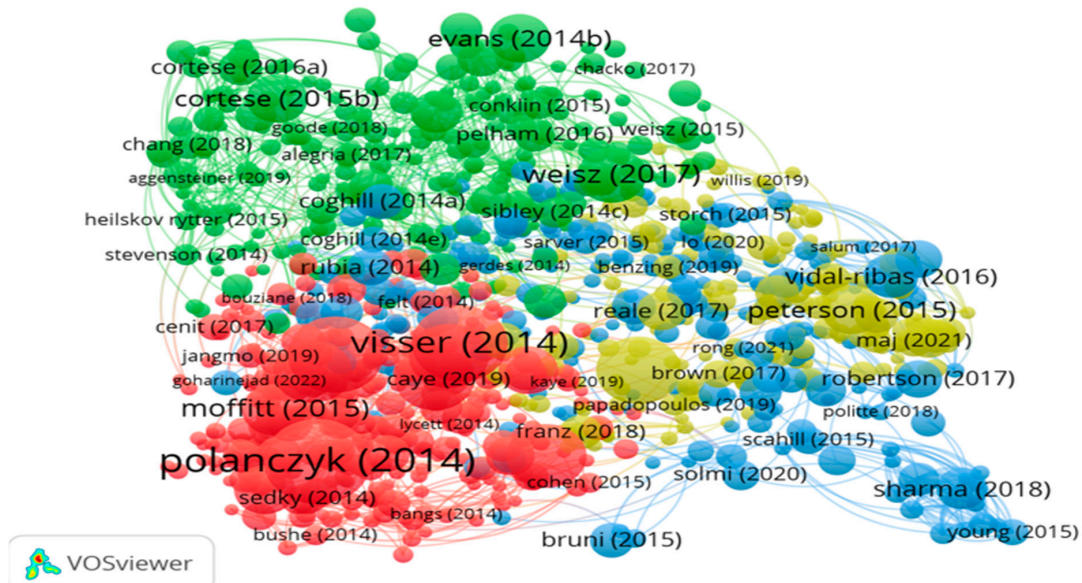


**Figure 7.** Co-authorship network in ADHD research. A visualization of the co-authorship network from a bibliometric analysis using VOSviewer, showing the interconnectedness and collaborative clusters among researchers in the field of ADHD studies as of 2014–2024.
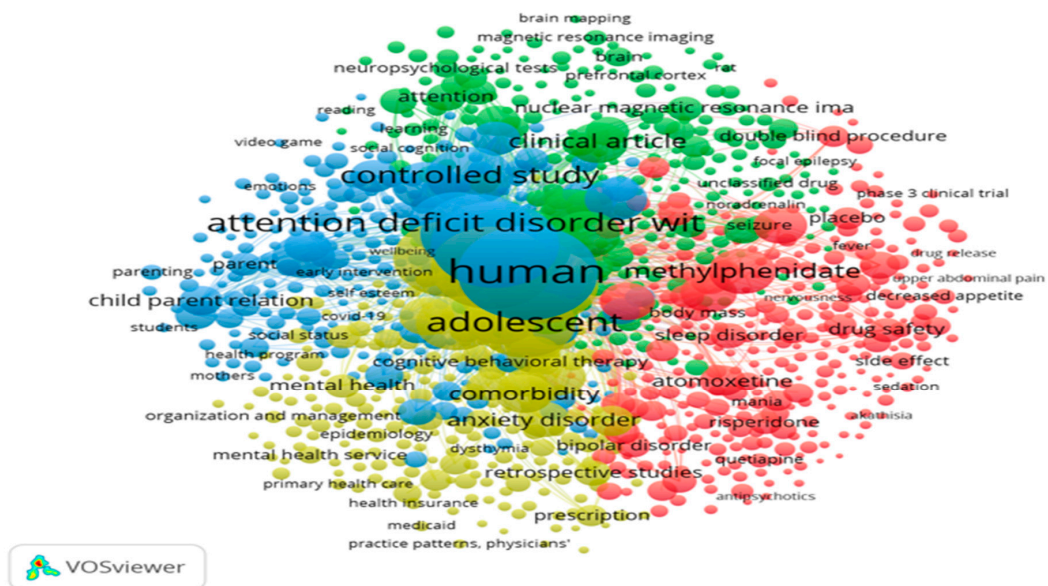


**Figure 8.** Keyword Co-occurrence network in ADHD research". This network map visualizes the co-occurrence of keywords in ADHD research, highlighting the most prevalent themes and their interrelations, with 'attention deficit disorder', 'human', and 'adolescent' as central nodes.

### 3.6.1. Bibliographic Coupling

Through the use of bibliometric analysis, we have found four distinct clusters (designated as yellow, blue, green, and red; Figures 7 and 8) that represent coherent bodies of literature, as shown in Figure 7. These clusters are distinguished by their notable interconnections, which are demonstrated by shared citations, showing distinct topic areas within the broader study environment. All articles inside these clusters are interconnected; however, certain relationships may seem weak or difficult to perceive due to their relative lack of strength. It is important to observe that, except for one piece that corrects an outlier, these publications are strongly interconnected through a network of references. This suggests a significant level of scholarly communication and theme coherence among them.

### 3.6.2. Co-Occurrence of Keywords

VOSviewer performed a comprehensive study of a substantial network consisting of 28,978 terms in the domain of health research. The collection was refined to a subset of 1,803 keywords that occurred at least 20 times, representing the predominant topics and concepts in the discipline. Subsequently, a particular selection of 1,000 keywords was selected, with each keyword signifying a fundamental aspect of research and scholarly discourse. This sample provides an intricate and thorough bibliometric map that illustrates the intricate connection between medical, psychosocial, and systemic factors in health literature. The selected keywords emphasize the interdependence of health research, with each term symbolizing a distinct facet of the complex web of elements that influence health outcomes and policy implications.

### 3.7. Cluster Analysis

Figure 8 illustrates the four groups that provide a comprehensive view of health, encompassing the intricate aspects of managing ADHD in children, the availability of healthcare, psychological and social issues, and environmental impacts. The ADHD cluster explores the comprehensive approach necessary for successful treatment and education techniques, emphasizing the importance of simultaneously addressing medical, sociological, and educational aspects. This aligns with the themes of the healthcare access cluster, which emphasizes the crucial influence of healthcare systems, policies, and socioeconomic factors in shaping the availability and quality of care. The inclusion of behavioral and psychosocial health as a cross-cutting subject implies a comprehensive perspective on health that considers both mental well-being and the effects on society. Finally, the environmental and organizational health cluster completes the overall understanding by analyzing the external elements that impact health behaviors and results. These clusters highlight the fact that health is influenced by complex connections between individual needs, institutional support, and societal structures. They emphasize the need for a comprehensive strategy that goes beyond traditional medical models.

### 3.7.1. Yellow Cluster: Holistic Approaches and Socioeconomic Considerations

This cluster comprises 50 articles that explore the various dimensions of managing ADHD and implementing treatment techniques for children. The focus is on a comprehensive approach, demonstrated by terminology such as "child health care", "mental health services", "pediatrician", and "medication adherence". This is a broad viewpoint that extends beyond medical intervention to encompass holistic support for young people affected by ADHD. For example, research conducted within the same group, such as the study conducted by Smith et al. (2019), shows that integrated care approaches can effectively improve the overall health and social functioning of children with ADHD. In the same vein, Jones and his colleagues (2020) emphasize the importance of tailored treatment strategies that consider the distinct developmental phase of each individual child, with a particular focus on the obstacles associated with the transition from adolescence to early adulthood. In addition, the cluster examines the wider sociocultural and economic aspects that impact the management of ADHD, such as "household income" and "socioeconomic factors". This

suggests that successful treatment of ADHD is also dependent on having a stable and supportive environment. Gomez et al. (2021) conducted research that establishes a correlation between the socio-economic level of families and the availability and standard of treatment options for ADHD. This research emphasizes the existence of inequalities and the necessity for fair and impartial healthcare services. In addition, this collection contains research that assesses the influence of ADHD on educational environments without explicitly examining the results of therapy. Lee and Park (2019) discovered that symptoms of ADHD had a substantial impact on both "educational status" and "academic performance", indicating the importance of implementing therapies within the school setting. Additionally, there are articles that examine the correlation between "risk factors" and "prevalence" of ADHD, with the goal of improving early identification and preventive measures, as stated by Nguyen et al. (2018). Significantly, the phrases "environmental sustainability" and "public health" also arise, indicating an acknowledgement of the wider public health framework required for addressing ADHD, as recommended by Chang (2020). This cluster provides a thorough examination of ADHD in children, covering several aspects such as direct treatment approaches, the impact of social and environmental factors, the implications for education, and the broader considerations for public health.

### 3.7.2. Blue Cluster: Navigating ADHD, Behavioral Challenges, and Educational Interventions

The Blue Cluster focuses on the interaction between academic performance and other psychological factors in the field of children and adolescent development, covering a total of 1734 publications. The cluster focuses on topics such as "ADHD", "behavior disorders", "parent-child relations", and "intervention". It provides a comprehensive analysis of the psychological and educational strategies that aim to assist children and adolescents with attention and behavioral difficulties. Research within this group extensively examines the diagnostic frameworks, such as the DSM series, therapeutic approaches like cognitive behavioral therapy, and the effects of these on academic performance and strategies for adaptation. Terms such as "meta-analysis" and "systematic review" indicate the existence of thorough and evaluative research that combines and analyzes findings from multiple independent studies. The conversations inside the cluster often revolve around the efficacy of various therapies and the impact of parental engagement on the results of therapy. For example, the prevalence of "family therapy" and "parent training" suggests an acknowledgment of the family's involvement in addressing conditions such as ADHD, as viewed from a systemic and relational perspective. This is additionally supported by publications that examine "parental stress" and "parental attitude", providing insight into the family environment's impact on the development of child diseases. Moreover, the cluster demonstrates a growing inclination towards technologically facilitated interventions, as indicated by the term "telemedicine", which implies a transition towards treatment methods that are more easily available and potentially conducted from a distance. This shift may be a result of recent worldwide developments, such as the COVID-19 pandemic. This is supported by the presence of "video game" in the cluster, which may be connected to both the difficulties of managing screen time in individuals with ADHD and the creative utilization of video game-based interventions for therapeutic reasons. The Blue Cluster encompasses a wide range of research that examines the complex aspects of developmental disorders in young populations. This study covers several areas, such as diagnostic criteria, the effectiveness of treatments, and the psychosocial factors that impact therapeutic results.

### 3.7.3. Green Cluster: Neurological Insights and Therapeutic Outcomes in Pediatric Conditions

This cluster consists of 60 papers that provide a comprehensive analysis of neurological development and therapy results in pediatric diseases. The research focuses on neurological illnesses, specifically acute lymphoblastic leukemia. The investigations investigate the genetic basis of these disorders and how they respond to anticonvulsants and other therapeutic drugs. The treatment regimens and side effects relevant to pediatric

care are characterized by a complicated network of terminology such as "adverse effects", "anticonvulsant therapy", and "cognitive dysfunction". The intersection of "biological markers" and "brain development" with pharmaceutical terminology indicates a multidisciplinary emphasis, combining neurobiology with therapeutic approaches. Research in this group focuses on investigating the relationship between diseases and treatments on brain function. This is performed by studying the "amygdala" and "prefrontal cortex", which are important areas involved in emotional regulation and executive function. These areas are particularly relevant in the field of pediatric neurology. The interconnected concepts of "epigenetics" and "neuroimaging" demonstrate a sophisticated analytical approach in the field, going beyond treating symptoms to investigate how genetic variables and changes in brain structure provide insights into prognosis and tactics for intervention. The correlation between "developmental delay" and "executive functions" underscores the cluster's emphasis on long-term results, highlighting the significance of early detection and customizing treatment approaches based on individual genetic profiles and neurodevelopmental paths. This cluster emphasizes the urgent requirement for customized therapy in juvenile neurological diseases, providing optimism for the implementation of more accurate and efficient management options.

### 3.7.4. Read Cluster: Treatment and Management of ADHD in Children

This cluster consists of a comprehensive collection of 60 studies that highlight the diverse strategies used for treating and managing ADHD in children. At the core of this group are pharmacological therapies, with stimulant drugs such as methylphenidate and amphetamines being widely used, highlighting their importance as the primary treatments. It is worth mentioning that there are also non-stimulant options available, such as atomoxetine and guanfacine. These alternatives demonstrate the expansion of pharmacological approaches for people who have different reactions and side effects. Furthermore, the cluster emphasizes the incorporation of behavioral treatments and educational initiatives, emphasizing the importance of a comprehensive treatment plan in addition to medications. The simultaneous use of phrases such as "behavioral therapy", "parent training", and "school-based interventions" indicates an acknowledgment of the significance of the environment and support structures in the management of ADHD. Furthermore, the inclusion of terminology such as "treatment adherence" and "patient education" suggests a prioritization of the durability of therapy and the proactive involvement of both caregivers and patients in the ongoing supervision. The links within the cluster demonstrate a developing comprehension of ADHD that goes beyond the use of medication. The correlation between "dietary modifications" and "cognitive outcomes" exemplifies the increasing focus on the impact of nutrition on managing symptoms of ADHD. The close association between "comorbid conditions" and essential ADHD treatment concepts highlights the importance of addressing concurrent diseases, such as anxiety and learning difficulties, that can greatly affect the effectiveness of therapy and the overall quality of life for children with ADHD. The complex connections within the cluster emphasize the movement towards individualized and comprehensive treatment in the field of pediatric ADHD.

### 3.8. Analysis of Keyword and Authorship Trends

Based on the bibliometric maps presented in Figures 9 and 10, which focus on the management and treatment of ADHD in children, we can deduce the following insights:

Figure 9 demonstrates a strong and recent interest in themes related to the management of ADHD in children, as indicated by the keyword density and their closeness in time. The keywords "attention deficit disorder", "adolescent", and "methylphenidate" are particularly noteworthy in this regard. A recent study has primarily focused on comprehending ADHD in adolescents and the therapeutic application of methylphenidate. The spatial grouping of these phrases, combined with their chronological indicators, indicates a significant increase in study or noteworthy progress in these fields in recent times.
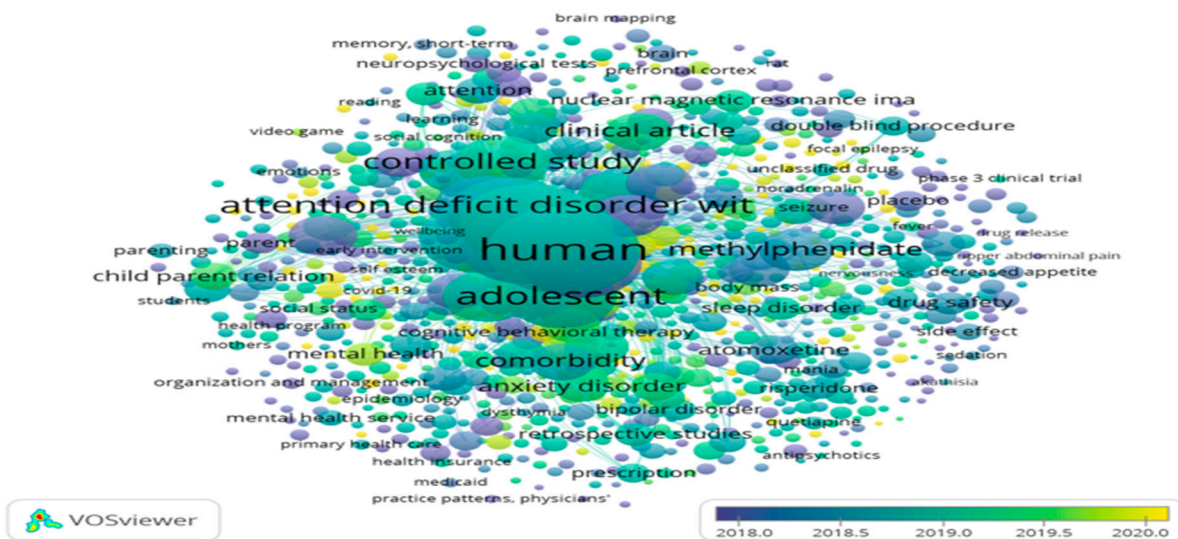
**Figure 9.** Keyword co-occurrence in ADHD research publications.
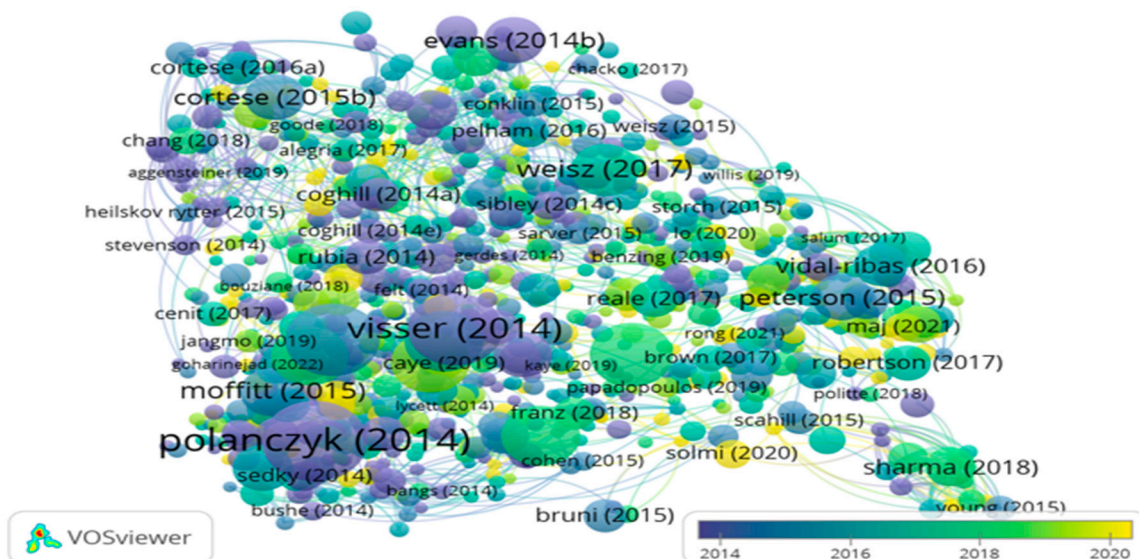


**Figure 10.** Temporal trends in ADHD research collaboration.

Figure 10 depicts a temporal network of author citations, demonstrating the interdependence of research efforts. Notable authors such as "Polanczyk (2014)" and "Caye (2019)" are likely to be significant contributors or prominent researchers in the field of managing ADHD in children. The clustering of citations during the period from 2016 to 2018 suggests a noteworthy phase of scientific productivity and cooperation among researchers, possibly indicating a period of important advancements in the area or when a group of papers influenced the trajectory of future research.

Both images convey the intricate web of academic dialogue within the field of ADHD in children, with the first highlighting thematic focus areas and the second delineating scholarly impact over time. The visual layout of these maps underlines the progression of research interests, the emergence of new insights, and how certain pivotal works can drive the field's focus forward. These maps serve as a testament to the dynamic nature of ADHD research, tracing the evolution of scientific discourse from a broad interest in ADHD within the context of adolescent health to more nuanced discussions around specific treatments like methylphenidate and the influential contributions of key researchers in shaping the field.

The bibliometric coupling maps offer a thorough depiction of the progression of ADHD research related to the supervision and therapy of children throughout the years. The maps demonstrate a distinct chronological sequence: initial investigations into the characterization of ADHD, predominantly linked to the green clusters, provide the foundation in the earlier years. Over time, attention has shifted towards the red clusters, signaling a move towards current research that explores improved treatment methods and the effectiveness of drugs like methylphenidate. The keyword and author citation maps reveal that early research, concentrated at the bottom, played a crucial role in formulating initial diagnostic and management approaches. However, the keywords and citations at the top indicate emerging themes that emphasize a more nuanced comprehension of ADHD. These themes encompass the investigation of comorbidities, patient-centered care, and long-term outcomes. The shift in time highlights a growing study field that has evolved from basic investigations to a comprehensive approach that tackles the intricacies of ADHD in children.

## 4. Discussion

An examination of research output and its influence over the last ten years has revealed valuable observations about the changing nature of scholarly communication. An evident decrease in the average number of citations per article and per year was seen between 2014 and 2024. This tendency could be attributed to several things, including a possible saturation of material on ADHD in children or a shift towards new fields of research. It is crucial to acknowledge the growing trend of collaboration in research and the difficulties in evaluating team contributions using bibliometrics [38]. Although the number of published articles has increased, the reduced citation impact indicates that newer studies may not be attracting as much attention or exerting as much influence as those published earlier in the decade. Moreover, the increasing inclination towards joint research endeavors may be a factor in the drop noticed, as it diminishes the citation influence of individual works.

Figure 2 demonstrates this pattern by depicting a decline in both Mean Citations per Article (MTC/Art) and Mean Citations per Year (MTC/Year), revealing a negative trend that raises concerns regarding the field of ADHD in children. This implies that although research is progressing, there may be a decrease in the overall academic and clinical enthusiasm or originality [39]. A decline in citations could indicate a diminished impact of recent research, which could have consequences for funding, the development of treatment, and the creation of intervention methods [39]. Moreover, a decrease in citations could impede the use of research findings to develop effective therapies for ADHD, as high-impact research plays a significant role in shaping clinical practice and policy decisions.

The research distribution, as illustrated in Figures 3 and 4, exhibits a significant rise in scholarly output, particularly from esteemed institutions such as the University of Toronto and the University of California. This highlights the crucial role that institutional contributions play in advancing scientific progress [40]. Contributions from the USA have increased significantly, suggesting a diversification in research efforts. This could bring new perspectives and methodologies to the ADHD field, enriching it [41–43].

The data analysis reveals additional issues with the decrease in Mean Citations per Article, despite a general rise in the yearly article count, particularly in 2024, where there is a significant decline, presumably attributed to inadequate data or other factors. The significant decrease in numbers may be attributed to changes in the quality of research or variations in research interests, as suggested by studies on citation dynamics [44,45]. The difficulties and obstacles of preserving citation performance in the face of increasing publication quantities are also shown here.

Although these trends mostly pertain to the realm of ADHD in children, they necessitate further investigation into how overarching tendencies impact this particular subject. The evolving field of study on ADHD is increasingly focused on understanding its genetic foundations [46,47] and the co-occurring diseases that often accompany it [41]. The need for continuous innovation and high-quality research is emphasized to guarantee signifi-

cant academic contributions, as supported by literature on the advantages of product and geographic variety in improving performance [48–50]. To summarize, although there is a significant amount of research being conducted on ADHD, the decreasing influence of citations highlights the importance of critically assessing the current direction and focus of ADHD research. Conducting meaningful and productive research on ADHD in children is a difficult task that requires joint efforts to solve. By advocating for research that is both methodologically rigorous and innovative, the academic community may enhance the significance and impact of its contributions, thereby enhancing the comprehension and management of ADHD in children.

The research output from 2014 to 2024 shows a complex change in the quantity and importance of academic work, indicating a developing area with shifting research influences. The consistent rise in publications from prominent universities and the broadening of contributions across different regions demonstrate an increasing dedication to innovation and a wider range of research methods.

The thematic analysis identifies key study areas within the discourse on ADHD, highlighting the significance of developmental phases and comorbidities. This indicates a strong emphasis and extensive network of studies that could provide valuable insights for future study or therapeutic practice. Nevertheless, the significant decline in the average number of citations per paper in 2024 indicates a crucial juncture for ADHD research, inviting contemplation on the essence and trajectory of next investigations.

Given the irregularities in the 2024 data, it is essential to approach these findings with care, highlighting the significance of having comprehensive and timely data for assessing study patterns. This extended period of time emphasizes the necessity for ongoing evaluation of research priorities and methodology in order to improve the influence and significance of ADHD research. Future plans may prioritize the promotion of influential research and international cooperation to revolutionize the comprehension and treatment of ADHD in youngsters.

*Implications for Clinical Practice and Policy-Making*

The field of ADHD research has experienced a significant expansion in the range of topics studied and an increase in international collaboration. This has important consequences for how ADHD is diagnosed and treated, as well as for the development of policies related to the disorder. The shift towards comprehensive treatment approaches is clear, as evidenced by a significant decrease in the influence of traditional pharmacological studies and a simultaneous increase in publications that emphasize non-pharmacological therapies and the social and environmental aspects of ADHD. This trend highlights the need for policies that support integrated care models, which promote the inclusion of environmental and behavioral therapies in addition to pharmacological treatments. The key aspect of this change is the recognition of connections between different areas of research, as demonstrated by important studies such as those conducted by "Danielson et al. (2018) [22], Vidal-Ribas et al. (2016) [51], Cortese, et al. (2015) [52], and Thapar et al. (2016) [53]". These studies collectively emphasize the increasing focus on non-pharmacological approaches in the treatment of ADHD in children. These interventions, as additionally corroborated by the research of Catalá-López et al. (2017) [54], involve a diverse array of tactics, such as cognitive behavioral therapy, mindfulness, cognitive remediation, and physical activity. In addition, innovative methods such as nutritional therapies and equine-assisted activities are receiving recognition for their potential in treating ADHD, as demonstrated by research conducted by Tarver et al. (2014) [55] and Pérez-Gómez et al. (2021) [56].

The movement towards a developmental approach in dealing with ADHD emphasizes the importance of integrated care models that combine environmental and behavioral methods with pharmaceutical treatments. This highlights the crucial function of such models in promoting comprehensive care [57]. Although pharmacological therapies have traditionally played a crucial role in managing ADHD, there is a growing agreement on the effectiveness of psychosocial approaches, especially when it comes to treating adults with ADHD.

Nevertheless, there is a lack of sufficient research in this field, highlighting the necessity for more rigorous studies to determine a definitive ranking of ADHD drugs based on their effectiveness and tolerability [58]. Moreover, our findings indicate that the profession recognizes the constraints that exist in current evidence-based therapies, indicating a pressing requirement for ongoing research and advancement in ADHD treatment approaches, and this was supported by one of the most cited documents by Chacko et al. (2014) [59]. This emerging paradigm in ADHD research and treatment emphasizes a crucial change towards more comprehensive and integrated methods, highlighting the significance of non-pharmacological therapies and the inclusion of socio-environmental components in developing effective treatment programs.

Within clinical settings, the results support the need for a more sophisticated approach to managing ADHD. This approach should be customized to the specific characteristics of each patient and based on the most current research trends. The growing global involvement in ADHD research highlights the significance of promoting international cooperation to standardize treatment recommendations and exchange exemplary methods. Furthermore, the prominent multidisciplinary aspect of ADHD research necessitates the implementation of policies that promote collaboration across several sectors, such as healthcare, education, and community services. This collaboration is crucial in order to effectively serve the diverse needs of individuals with ADHD.

Integrating these observations into the process of creating policies could help in the creation of extensive support networks for individuals with ADHD, leading to better results and an improved quality of life. Furthermore, it is important to acknowledge the ever-changing nature of ADHD research. Policies should be flexible enough to integrate new information and ensure that therapeutic practices are up-to-date with the latest scientific breakthroughs.

## 5. Conclusions

This study presents a detailed bibliometric analysis that provides a deep comprehension of the patterns, collaborative networks, and thematic emphases in ADHD research between 2014 and 2024. The results of our study demonstrate an intricate relationship between the amount of research produced and its academic influence, as well as a changing environment of research topics and partnerships. There has been a consistent growth in the amount of research produced by esteemed institutions, as well as a broadening of contributions from different regions, with a notable increase in research coming from the United States of America, the United Kingdom, the Netherlands, Canada, and China. Although there has been an increase in research, the decrease in citation metrics indicates a potential lack of impact within the scholarly community. The thematic analysis emphasizes that 'attention deficit disorder', 'autism', and 'comorbidity' continue to be key and interrelated topics in the area, suggesting that the scientific community is actively involved in addressing these ongoing difficulties. Furthermore, the networks of co-authorship and keyword co-occurrence reveal a dynamic academic environment marked by strong collaboration and a concentrated theme investigation.

The bibliometric trends of the previous decade offer a glimpse into a lively and intricate study field. However, the issue moving forward is to ensure that this liveliness leads to significant advancements in our comprehension and handling of ADHD. The discipline of ADHD is positioned to achieve substantial progress in the near future by emphasizing the development of influential research and promoting a culture of collaboration and responsiveness.

## 6. Future Directions

When considering the future, various suggestions and forecasts arise:

Emphasizing Significance over Quantity: Future research attempts should focus on the significance and influence of their findings rather than the sheer number of studies conducted. Efforts that support inventive study designs, interdisciplinary approaches, and

practical applicability are crucial for improving the impact and significance of ADHD research.

Collaboration and Integration: Enhancing and expanding collaboration networks can result in more comprehensive and well-rounded insights into ADHD. Exploring the potential for increased integration of technical breakthroughs, such as machine learning and data analytics, to effectively manage and interpret large volumes of research data are necessary.

Key Patterns: As the discipline advances, it is important to prioritize research on new themes such as the impact of technology on managing ADHD and the long-term course of the illness. Future research should focus on investigating the connections between ADHD and educational results, adult manifestations, and non-pharmacological therapies, as these areas show potential for further inquiry.

Global Research Dynamics: By promoting international collaborations and recognizing regional disparities in ADHD prevalence, management, and impact, we can develop a more comprehensive global understanding of the illness.

Policies and Practices: It is essential to establish a connection between research and practice. Facilitating discussions between policymakers, practitioners, and researchers guarantees that research findings are effectively applied to therapies and policies that positively impact persons with ADHD and their communities.

## 7. Limitation of the Study

This study has some limitations. It covers the period of analysis between 2014 and 2024. We recommend other studies to analyze ADHD bibilometrically in different periods.

## Appendix A

**Table A1.** Yellow cluster: Most 20 publications with high citation frequency from the bibliographic coupling analysis.

| Author and Year | Article URL (Accessed on 15 April 2024) | Total Link Strength | Citation Frequency |
| --- | --- | --- | --- |
| Danielson et al. (2018a) | https://doi.org/10.1080/15374416.2017.1417860 | 663 | 687 |
| Peterson et al. (2015) | https://doi.org/10.1146/annurev-clinpsy-032814-112842 | 369 | 363 |
| Reale et al. (2017) | https://doi.org/10.1007/s00787-017-1005-z | 923 | 236 |
| Lewis et al. (2019) | https://doi.org/10.1016/s2215-0366(19)30031-8 | 266 | 225 |
| Bolea-alamañac et al. (2014) | https://doi.org/10.1177/0269881113519509 | 1528 | 203 |

**Table A1.** *Cont.*

| Author and Year | Article URL (Accessed on 15 April 2024) | Total Link Strength | Citation Frequency |
|---|---|---|---|
| Faraone et al.(2019a) | https://doi.org/10.1111/jcpp.12899 | 641 | 185 |
| Mcguire et al. (2015) | https://doi.org/10.1002/da.22389 | 352 | 185 |
| Franz et al. (2018) | https://doi.org/10.1542/peds.2017-1645 | 659 | 182 |
| Sukhodolsky et al. (2016) | https://doi.org/10.1089/cap.2015.0120 | 404 | 141 |
| Barkley (2014) | https://doi.org/10.1007/s10802-013-9824-y | 431 | 140 |
| Maj et al. (2021) | https://doi.org/10.1002/wps.20809 | 287 | 139 |
| Doernberg and Hollander (2016) | https://doi.org/10.1017/s1092852916000262 | 255 | 134 |
| Williamson and Johnston (2015) | https://doi.org/10.1016/j.cpr.2015.05.005 | 1075 | 123 |
| Brown et al. (2017) | https://doi.org/10.1016/j.acap.2016.08.013 | 464 | 115 |
| Lecendreux et al. (2015) | https://doi.org/10.5665/sleep.4910 | 507 | 104 |
| Weisz et al. (2019) | https://doi.org/10.1177/1745691618805436 | 516 | 100 |
| Parker et al. (2019) | https://doi.org/10.1126/scitranslmed.aau7356 | 455 | 98 |
| Iorfino et al. (2019) | https://doi.org/10.1001/jamapsychiatry.2019.2360 | 304 | 94 |
| Thompson et al. (2018) | https://doi.org/10.1111/cen.13550 | 271 | 93 |
| Benzing and Schmidt (2019) | https://doi.org/10.1111/sms.13446 | 577 | 90 |

**Table A2.** Blue cluster: most 20 publications with high citation frequency from the bibliographic coupling analysis.

| Author and Year | Article URL (Accessed on 15 April 2024) | Total Link Strength | Citation Frequency |
|---|---|---|---|
| Vidal-ribas et al. (2016) | https://doi.org/10.1016/j.jaac.2016.04.014 | 618 | 300 |
| Sharma et al. (2018) | https://doi.org/10.1016/j.pharmthera.2018.05.007 | 305 | 266 |
| Robertson et al. (2017) | https://doi.org/10.1038/nrdp.2016.97 | 436 | 219 |
| Brotman et al. (2017) | https://doi.org/10.1176/appi.ajp.2016.16070839 | 718 | 214 |
| Rubia et al. (2014) | https://doi.org/10.1016/j.biopsych.2013.10.016 | 641 | 206 |
| Fairchild et al. (2019) | https://doi.org/10.1038/s41572-019-0095-y | 195 | 196 |
| Bruni et al. (2015) | https://doi.org/10.1016/j.ejpn.2014.12.007 | 139 | 194 |
| Coghill et al. (2014a) | https://doi.org/10.1016/j.biopsych.2013.10.005 | 681 | 192 |
| Luo et al. (2019) | https://doi.org/10.3389/fnhum.2019.00042 | 1037 | 182 |
| Olfson et al. (2015) | https://doi.org/10.1001/jamapsychiatry.2015.0500 | 207 | 180 |
| Howes et al. (2018) | https://doi.org/10.1177/0269881117741766 | 411 | 168 |
| Murphy et al. (2016) | https://doi.org/10.2147/ndt.s65455 | 635 | 159 |
| Solmi et al. (2020) | https://doi.org/10.1002/wps.20765 | 390 | 145 |
| Goldstein et al. (2017) | https://doi.org/10.1111/bdi.12556 | 741 | 143 |
| Antshel et al. (2016) | https://doi.org/10.1586/14737175.2016.1146591 | 757 | 143 |
| Jobski et al. (2017) | https://doi.org/10.1111/acps.12644 | 186 | 141 |
| Dunn et al. (2019) | https://doi.org/10.1016/j.pbb.2019.05.005 | 372 | 136 |
| Demaso et al. (2017) | https://doi.org/10.1542/peds.2016-2241 | 230 | 132 |
| Scahill et al. (2015) | https://doi.org/10.1176/appi.ajp.2015.15010055 | 241 | 122 |
| Anagnostou et al. (2014) | https://doi.org/10.1503/cmaj.121756 | 476 | 122 |

**Table A3.** Green cluster: most 20 publications with high citation frequency from the bibliographic coupling analysis.

| Author and Year | Article URL (Accessed on 15 April 2024) | Total Link Strength | Citation Frequency |
|---|---|---|---|
| Weisz et al. (2017) | https://doi.org/10.1037/a0040360 | 353 | 463 |
| Cortese et al. (2015b) | https://doi.org/10.1016/j.jaac.2014.12.010 | 587 | 359 |
| Evans et al. (2014b) | https://doi.org/10.1080/15374416.2013.850700 | 818 | 356 |
| Daley et al. (2014) | https://doi.org/10.1016/j.jaac.2014.05.013 | 1214 | 259 |
| Evans et al. (2018a) | https://doi.org/10.1080/15374416.2017.1390757 | 1077 | 218 |
| Hechtman et al. (2016) | https://doi.org/10.1016/j.jaac.2016.07.774 | 351 | 190 |
| Cortese et al. (2016a) | https://doi.org/10.1016/j.jaac.2016.03.007 | 704 | 187 |
| Chan et al. (2016) | https://doi.org/10.1001/jama.2016.5453 | 1345 | 182 |
| Chacko et al. (2014b) | https://doi.org/10.1111/jcpp.12146 | 273 | 182 |
| Van doren et al. (2019) | https://doi.org/10.1007/s00787-018-1121-4 | 768 | 169 |
| Tarver and Sayal (2014) | https://doi.org/10.1111/cch.12139 | 1813 | 169 |
| Pelham et al. (2016) | https://doi.org/10.1080/15374416.2015.1105138 | 796 | 167 |
| Bunford et al. (2015) | https://doi.org/10.1007/s10567-015-0187-5 | 616 | 160 |
| Sibley et al. (2014c) | https://doi.org/10.1016/j.cpr.2014.02.001 | 1379 | 138 |
| Myers et al. (2015) | https://doi.org/10.1016/j.jaac.2015.01.009 | 551 | 134 |
| Chang et al. (2018) | https://doi.org/10.1038/npp.2017.160 | 320 | 124 |
| Hodgson et al. (2014) | https://doi.org/10.1177/1087054712444732 | 224 | 118 |
| Micoulaud-franchi et al. (2014) | https://doi.org/10.3389/fnhum.2014.00906 | 773 | 114 |
| Daley et al. (2017) | https://doi.org/10.1111/jcpp.12825 | 777 | 113 |
| Conklin et al. (2015) | https://doi.org/10.1200/jco.2015.61.6672 | 305 | 113 |

**Table A4.** Red cluster: most 20 publications with high citation frequency from the bibliographic coupling analysis.

| Author and Year | Article URL (Accessed on 15 April 2024) | Total Link Strength | Citation Frequency |
|---|---|---|---|
| Polanczyk et al. (2014) | https://doi.org/10.1093/ije/dyt261 | 417 | 1111 |
| Visser et al. (2014) | https://doi.org/10.1016/j.jaac.2013.09.001 | 412 | 890 |
| Faraone et al. (2015) | https://doi.org/10.1038/nrdp.2015.20 | 1823 | 889 |
| Thapar and Cooper (2016) | https://doi.org/10.1016/s0140-6736(15)00238-x | 2093 | 631 |
| Cortese et al. (2018b) | https://doi.org/10.1016/s2215-0366(18)30269-4 | 853 | 618 |
| Wolraich et al. (2019b) | https://doi.org/10.1542/peds.2019-2528 | 1044 | 615 |
| Sayal et al. (2018) | https://doi.org/10.1016/s2215-0366(17)30167-0 | 1357 | 586 |
| Moffitt et al. (2015) | https://doi.org/10.1176/appi.ajp.2015.14101266 | 924 | 407 |
| Cortese et al. (2016b) | https://doi.org/10.1176/appi.ajp.2015.15020266 | 563 | 360 |
| Sharma et al. (2014) | https://doi.org/10.1177/1060028013510699 | 1225 | 352 |
| Agnew-blais et al. (2016) | https://doi.org/10.1001/jamapsychiatry.2016.0465 | 481 | 288 |
| Storebø et al. (2015b) | https://doi.org/10.1002/14651858.cd009885.pub2 | 356 | 239 |
| Ginsberg et al. (2014) | https://doi.org/10.4088/pcc.13r01600 | 612 | 208 |
| Asherson et al. (2016) | https://doi.org/10.1016/s2215-0366(16)30032-3 | 1032 | 199 |
| Swanson et al. (2017) | https://doi.org/10.1111/jcpp.12684 | 620 | 194 |
| Gajria et al. (2014) | https://doi.org/10.2147/ndt.s65721 | 644 | 188 |
| Feldman et al. (2014) | https://doi.org/10.1056/nejmcp1307215 | 1127 | 180 |
| Storebø et al. (2016) | https://doi.org/10.1002/14651858.cd012069 | 622 | 173 |
| Harpin et al. (2016) | https://doi.org/10.1177/1087054713486516 | 883 | 169 |

## Appendix B

**Table A5.** Keywords from the keyword co-occurrence analysis.

| Yellow Cluster | | | Blue Cluster | | |
|---|---|---|---|---|---|
| **Keywords** | **TLS \*** | **OF \*\*** | **Keywords** | **TLS** | **OF** |
| Humans | 157,859 | 5495 | Human | 194,801 | 7087 |
| Female | 140,273 | 4723 | Child | 169,182 | 6037 |
| Attention deficit disorder | 132,699 | 4620 | Male | 145,360 | 4954 |
| Adolescent | 114,355 | 3796 | Attention deficit disorder with hyperactivity | 89,812 | 3328 |
| Major clinical study | 77,204 | 2378 | Controlled study | 82,622 | 2717 |
| Adult | 61,552 | 1968 | Attention deficit hyperactivity disorder | 54,011 | 2080 |
| Preschool child | 48,208 | 1521 | ADHD | 38,603 | 1734 |
| Comorbidity | 40,391 | 1271 | Psychology | 43,881 | 1471 |
| Depression | 44,136 | 1264 | Treatment outcome | 45,509 | 1443 |
| Mental disease | 36,554 | 1093 | Randomized controlled trial | 28,032 | 918 |
| Anxiety disorder | 35,934 | 984 | Procedures | 23,328 | 833 |
| Prevalence | 23,676 | 757 | Anxiety | 26,703 | 816 |
| Retrospective study | 23,955 | 744 | Questionnaire | 22,888 | 775 |
| Young adult | 24,454 | 716 | Disease severity | 25,099 | 745 |
| Cohort analysis | 23,592 | 699 | Children | 18,339 | 706 |
| Risk factor | 21,097 | 664 | Outcome assessment | 22,223 | 684 |
| Retrospective studies | 16,958 | 504 | Child parent relation | 18,674 | 681 |
| Mental health | 14,671 | 497 | Parents | 18,022 | 665 |
| Comparative study | 15,248 | 478 | Autism spectrum disorder | 18,267 | 600 |
| Cross-sectional study | 13,597 | 456 | Conduct disorder | 19,171 | 574 |
| Age | 13,256 | 398 | Oppositional defiant disorder | 18,700 | 561 |
| Mental disorders | 12,679 | 365 | Quality of life | 17,357 | 552 |
| Prescription | 13,187 | 363 | Systematic review | 15,914 | 541 |
| United states | 11,214 | 358 | Attention-deficit/hyperactivity disorder | 13,749 | 535 |
| Child psychiatry | 11,127 | 350 | Hyperactivity | 15,896 | 500 |
| Risk factors | 10,440 | 324 | Behavior therapy | 13,298 | 462 |
| Middle aged | 10,577 | 316 | Impulsiveness | 14,218 | 461 |
| Pediatrics | 8880 | 307 | Behavior disorder | 15,799 | 450 |
| Practice guideline | 9569 | 301 | Parent | 13,287 | 431 |
| Longitudinal study | 9742 | 296 | dsm-5 | 12,025 | 374 |
| Statistics and numerical data | 9725 | 295 | Cognitive behavioral therapy | 12,003 | 355 |
| Posttraumatic stress disorder | 10,370 | 286 | Attention deficit and disruptive behavior disorders | 9243 | 340 |
| Cross-sectional studies | 8579 | 273 | Psychotherapy | 10,934 | 335 |
| Sex difference | 9190 | 273 | Meta-analysis | 9151 | 326 |
| Risk assessment | 9012 | 272 | Child behavior | 9713 | 321 |
| Clinical practice | 8559 | 256 | Major depression | 12011 | 314 |
| Childhood disease | 8209 | 253 | Surveys and questionnaires | 9461 | 309 |
| Cohort studies | 8540 | 249 | Education | 8526 | 304 |
| Mental health service | 7477 | 249 | Problem behavior | 9011 | 296 |
| Drug dependence | 6845 | 203 | Treatment | 7858 | 289 |

\* TLS: total link strength; \*\* OF: occurrence frequency.

**Table A6.** Keywords from the keyword co-occurrence analysis.

| Green Cluster | | | Red Cluster | | |
|---|---|---|---|---|---|
| **Keywords** | **TLS *** | **OF \*\*** | **Keywords** | **TLS** | **OF** |
| Article | 144,295 | 4828 | Methylphenidate | 51,994 | 1667 |
| Priority journal | 54,493 | 1717 | Central stimulant agent | 37,158 | 1163 |
| Autism | 44,753 | 1406 | Review | 32,481 | 1138 |
| School child | 41,802 | 1335 | Central nervous system stimulants | 32,341 | 1043 |
| Clinical article | 38,844 | 1327 | Atomoxetine | 27,146 | 774 |
| Follow up | 37,736 | 1168 | Drug efficacy | 22,853 | 613 |
| Complication | 24,999 | 821 | Treatment duration | 19,753 | 562 |
| Cognition | 21,778 | 750 | Sleep disorder | 18,880 | 507 |
| Pathophysiology | 20,273 | 690 | Treatment response | 16,552 | 494 |
| Attention | 17,327 | 623 | Obsessive compulsive disorder | 17,933 | 479 |
| Case report | 15,545 | 578 | Drug safety | 18,765 | 473 |
| Executive function | 14,643 | 530 | Randomized controlled trial (topic) | 14,850 | 449 |
| Physiology | 14,145 | 522 | Mood disorder | 16,896 | 448 |
| Intellectual impairment | 17,135 | 501 | Headache | 17,254 | 438 |
| Nuclear magnetic resonance imaging | 14,569 | 476 | Bipolar disorder | 16,994 | 437 |
| Disease association | 14,277 | 456 | Neuroleptic agent | 18,302 | 435 |
| Infant | 14,613 | 434 | Risperidone | 17,706 | 417 |
| Cognitive defect | 13,935 | 430 | Aggression | 15,312 | 410 |
| Epilepsy | 13,662 | 406 | Placebo | 15,274 | 392 |
| Neuropsychological test | 11,901 | 388 | Insomnia | 16,414 | 389 |
| Intelligence quotient | 12,747 | 387 | Clinical trial | 13,102 | 376 |
| Clinical feature | 12,436 | 382 | Double blind procedure | 13,074 | 372 |
| Learning disorder | 12,417 | 378 | Irritability | 14,146 | 353 |
| Genetics | 11,235 | 362 | Guanfacine | 13,530 | 343 |
| Prospective study | 11,924 | 360 | Tic | 12,885 | 336 |
| Drug effect | 10,574 | 346 | Psychosis | 13,134 | 335 |
| Working memory | 10,130 | 346 | Antidepressant agent | 13,337 | 321 |
| Electroencephalography | 9691 | 337 | Drug withdrawal | 12,672 | 320 |
| Seizure | 10,917 | 295 | Multicenter study | 11,226 | 308 |
| Brain | 8046 | 294 | Schizophrenia | 11,577 | 305 |
| Follow-up studies | 9913 | 294 | Clonidine | 12,039 | 299 |
| Neuropsychological tests | 8770 | 284 | Lisdexamfetamine | 9929 | 276 |
| Clinical outcome | 8441 | 266 | Aripiprazole | 12,322 | 274 |
| Newborn | 8506 | 259 | Double-blind method | 9819 | 272 |
| Neuroimaging | 7725 | 250 | Psychological rating scale | 9407 | 267 |
| Case control study | 7618 | 247 | Drug tolerability | 11,113 | 262 |
| Drug effects | 7977 | 237 | Side effect | 11,526 | 256 |
| Obesity | 7559 | 233 | Dexamphetamine | 9728 | 254 |
| Electroencephalogram | 6918 | 231 | Amphetamine | 9174 | 250 |
| Pregnancy | 7281 | 228 | Psychotropic agent | 9574 | 249 |

\* TLS: total link strength; \*\* OF: occurrence frequency.

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