PAPER

Insight into the Trends in Research on the Impact of Social Media on Adolescent Mental Health: A Bibliometric Analysis

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ABSTRACT

This study investigates the impact of social media on adolescent mental health through a bibliometric analysis of literature from 2004 to 2024 in the web of science database. With internet usage among adolescents exceeding 87% and instant messaging rates reaching 84.1%, platforms such as Facebook and Instagram significantly affect their mental well-being. The study identifies "anxiety," "depression," and "adolescents" as central themes, demonstrating a strong correlation between high-frequency social media use and mental health issues. Adolescents, the most affected group, face significant risks from prolonged social media exposure. The United Kingdom leads study collaborations in this field. The findings highlight the complexity of social media's impact on mental health, influenced by various factors ranging from childhood experiences to specific psychological issues. Emphasizing adolescent mental health, the study calls for future study to explore the long-term effects of social media use and develop effective intervention measures and policy recommendations. This scientific evidence aims to guide policymakers, educators, and parents in promoting the comprehensive development and well-being of adolescents, helping them navigate the digital age healthily and safely.

KEYWORDS

social media, adolescents, mental health, anxiety, depression, bibliometric analysis

1   INTRODUCTION

In today's digital era, social media is integral to daily life globally, bridging distances and transforming traditional social interactions. Platforms such as Facebook and Instagram, with over three billion and two billion users, respectively, as of May 2024, facilitate real-time communication through text, images, and videos. The 2023 international digital development study report [1–3] highlights that over 87% of

individuals aged 12 and above use the internet, with 66.9% frequently online and 84.1% using instant messaging.

Previous study indicates that social media's impact on adolescent mental health is complex, involving issues such as depression and anxiety influenced by childhood experiences. While social media fosters connections and information exchange, it also poses potential negative impacts on adolescents' mental well-being [4–9].

This study aims to explore the latest study on social media's impact on adolescent mental health through a bibliometric analysis of literature from 2004 to the present in the web of science database [10]. This study is limited to the web of science database because it provides comprehensive coverage of high-impact study across various disciplines, ensuring the quality and relevance of the included studies. By examining basic data, keyword trends, and study development, the study seeks to reveal the evolution of study focuses and provide robust evidence for future study, policy-making, and educational practices. The goal is to offer scientific insights and recommendations to support the comprehensive development and mental health of adolescents.

2   METHODOLOGY

This study systematically collects and analyzes literature related to the association between adolescent mental health and social media use through the web of science platform using bibliometric analysis. The analysis includes keyword trend analysis, keyword clustering, betweenness and closeness centrality analysis, study trend evolution, and recommendations for future study topics.

First, the Bibliometrix tool analyzes the frequency and co-occurrence relationships of keywords in literature from different periods, tracking the evolution of study focuses. Keyword clustering, betweenness centrality, and closeness centrality analyses identify key themes and core concepts. Study trend evolution tracks changes in the number of studies over time to analyze shifts in study focuses and methods. Finally, the study compares these trends to summarize recommendations for future study.

The collected data demonstrates the development trends and academic influence of study on the impact of social media on adolescent mental health over the past two decades. This study covers multiple academic sources and a wide range of topics, reflecting its depth and breadth. The data shows a high degree of international collaboration, and through keyword analysis and study topic development, it reveals the diversity and complexity of the study content. This provides insights and evaluations for the development of future study.

3   ANALYSIS, RESULTS, AND DISCUSSIONS

3.1   Explanation of basic data from collected literature analysis

The bibliometric analysis of study on the impact of social media on adolescent mental health from 2004 to 2024 reveals significant trends and insights. This study used data from this period mainly because social media applications only began to be widely used starting in 2004; therefore, we collected data from this timeframe as the primary study period. The dataset encompasses 50 relevant documents from 46 journals and books, reflecting a 4.69% annual growth rate in study literature. Each document is cited an average of 26.56 times, indicating notable academic influence.

The analysis includes 235 keywords plus 172 author keywords, highlighting the diversity of study topics. A total of 246 authors contributed to these studies, with

an average of five co-authors per document, and nine studies authored by single authors. International cooperation accounts for 18% of the collaborations, indicating a degree of cross-national study.

Among the analyzed documents, 46 are articles, with one early access article and three review articles. This comprehensive data analysis outlines the development trends, collaboration patterns, citation practices, and study focuses in this field over the past two decades, offering valuable insights into the evolution of studies on the impact of social media on adolescent mental health.

3.2 Analysis of keyword changes in related Research papers

The keyword analysis identifies nine clusters, each reflecting the importance and relevance of keywords in study on the impact of social media on adolescent mental health. Clustering, betweenness centrality, and closeness centrality metrics highlight the interconnectedness within the study network, as shown in Figure 1. Figure 2 details the relationships between the keyword "symptoms" and various study nodes.
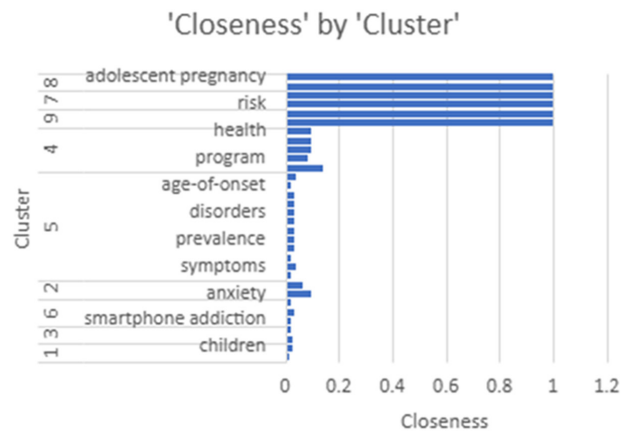

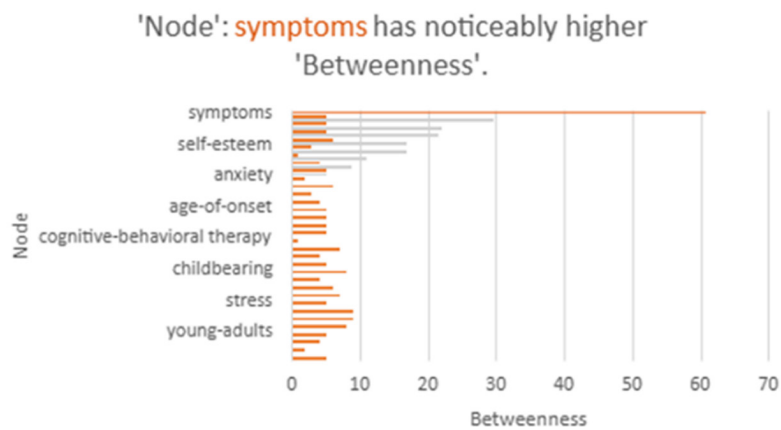**Fig. 1.** Clustering, betweenness centrality, and closeness centrality of study keywords

Fig. 2. High correlation analysis of symptoms with various study nodes

Discussions:
The keyword analysis identifies significant terms and their roles within the study on social media's impact on adolescent mental health. In the first cluster, "children" shows high betweenness centrality, indicating strong connectivity, whereas

"cognitive-behavioral therapy" exhibits lower connectivity. The second cluster highlights "anxiety" and "adolescent" as core terms, with "anxiety" playing a mediating role. The third cluster features "self-esteem" as a critical node, emphasizing its importance. In the fourth cluster, "women" emerges as a core node, alongside significant terms such as "health," "pregnancy," and "mental disorders." The fifth cluster identifies "symptoms," "adolescents," and "disorders" as influential themes central to the field. In the sixth cluster, "depression" stands out as a pivotal node, while "association" and "smartphone addiction" show lower connectivity. The seventh cluster includes "risk" and "mental health," both with high closeness centrality. The eighth cluster focuses on "childbearing" and "adolescent pregnancy," while the ninth cluster highlights "age" and "birth," both demonstrating high closeness centrality. These clusters illustrate the relationships and significance of various keywords, providing insights into key focus areas and trends in study on the impact of social media on adolescent mental health.

3.3 Keyword occurrence frequency in studies on the impact of social media on adolescent mental health

Figure 3 shows the frequency of keywords in study on the impact of social media on adolescent mental health. "Adolescents" is the most common term, appearing 10 times, highlighting the primary focus on this age group. "Symptoms" follows with nine occurrences, indicating a major focus on symptomatology. "Depression" and "disorders" each appear eight times, underscoring their importance.

"Prevalence" appears seven times, reflecting an interest in the commonality of psychological issues. "Anxiety" and "association" each appear six times, showing their significance. "Childhood," "children," and "self-esteem" each appear five times, emphasizing the roles of early life stages and self-esteem in adolescent mental health study.

These keyword frequencies reveal the main themes and focal points in this field, including adolescents, symptoms, depression, psychological disorders, prevalence, anxiety, associated factors, childhood, children, and self-esteem.
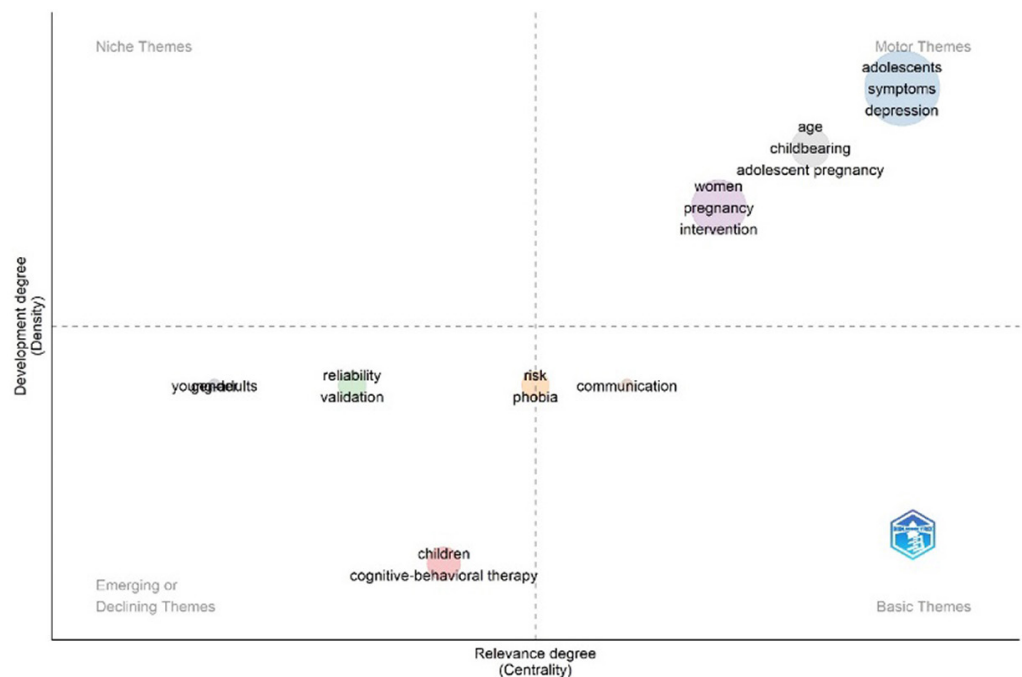

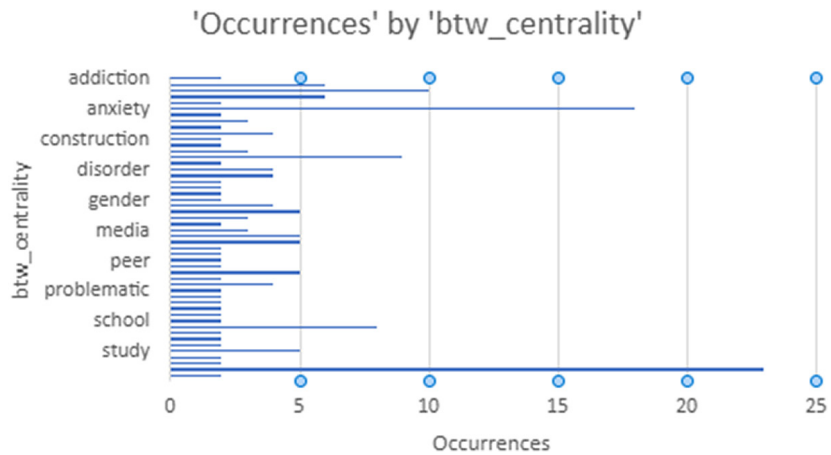**Fig. 3.** Frequency of keywords in studies on the impact of social media on adolescent mental health

Relationship between keyword occurrences and betweenness centrality in studies on the impact of social media on adolescent mental health

Figures 3 and 4 illustrate the frequency and centrality of keywords in studies on the impact of social media on adolescent mental health. The chart "Occurrences by Betweenness Centrality" shows how often each keyword appears and its role as a bridge within the study network, measured by betweenness centrality.

Discussion:

Addiction and anxiety are both frequently mentioned keywords with high betweenness centrality, indicating their crucial bridging roles within the study network. Their prominence suggests they are key focal points and connectors among various studies on social media's impact on adolescent mental health. Conversely, keywords such as disorder and peer, despite their high occurrence rates, have lower betweenness centrality, implying that while they are commonly mentioned, they do not serve as critical connectors between different studies.

Media and gender have moderate occurrence rates and betweenness centrality, signifying their significant roles in the study and their function as connectors across different themes within the field. In contrast, keywords such as school and study have lower occurrence rates and betweenness centrality, suggesting their influence and connectivity within the study are relatively minimal.

This analysis highlights the importance and connectivity of certain keywords in the study. Keywords with high frequency and high centrality, like addiction and anxiety, play pivotal roles, acting as both primary study focuses and bridges between different studies. Keywords such as disorder, which appear frequently but have low betweenness centrality, indicate they are often studied but have limited bridging roles. This helps us understand the core concepts and their interrelationships in this field of study.

3.4 Analysis of the relationship between major publishing countries and keywords

Figure 5 presents a Sankey diagram illustrating the relationships among primary authors, their collaborating countries, and the study keywords in studies on the impact of social media on adolescent mental health. This diagram highlights the key players and themes within the study network, offering a clear visual representation of the structure and focus of the study.
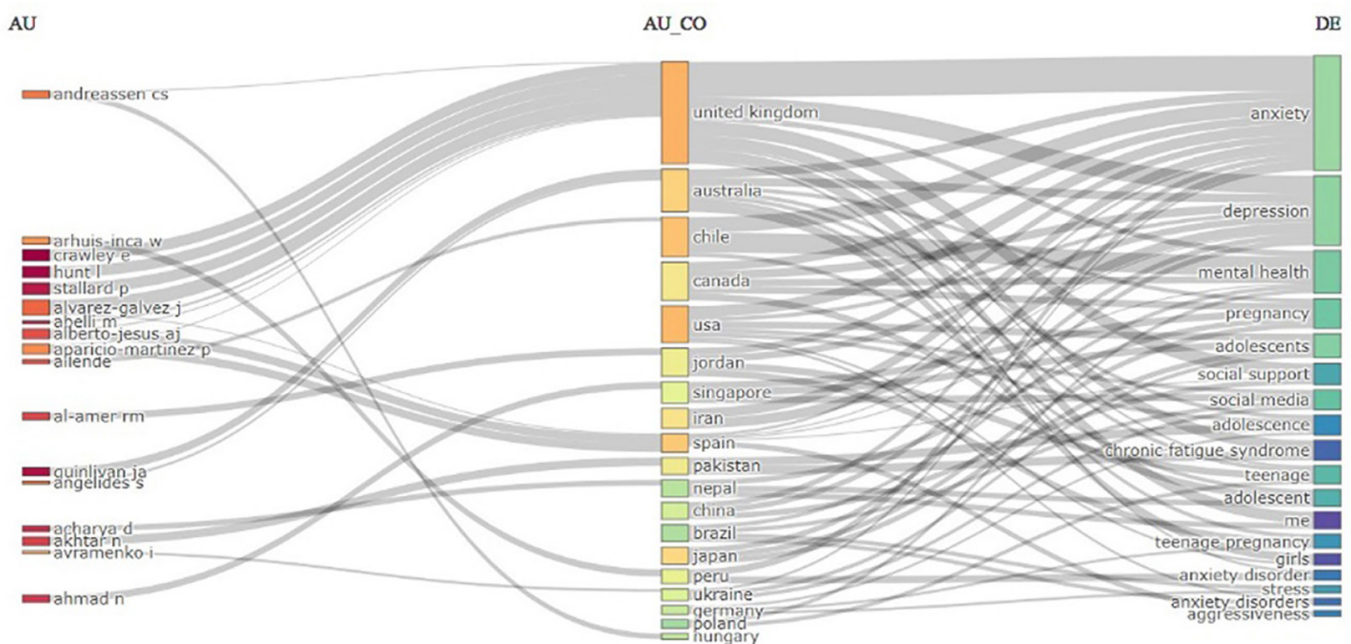
Fig. 5. Sankey diagram of the relationships between major publishing countries, authors, and keywords in study on the impact of social media on adolescent mental health

Discussion:

Figure 5 presents a Sankey diagram illustrating key relationships in study on the impact of social media on adolescent mental health.

Primary study authors (AU): Notable authors such as Andreassen CS, Arhuis-Inca W, and Crawley E are represented by different colors, connected to their collaborating countries and study keywords. This indicates their contributions and specific study focuses.

Collaborating countries (AU_CO): Key collaborating countries, such as the United Kingdom, Australia, Chile, the USA, and Canada, are shown in different colors. Lines illustrate the frequency and extent of international collaborations, with Andreassen CS frequently collaborating with the United Kingdom, highlighting strong academic ties.

Study keywords (DE): The main keywords, including anxiety, depression, mental health, pregnancy, adolescents, social support, social media, and chronic fatigue syndrome, represent primary study themes. The lines from collaborating countries to these keywords indicate the focus areas.

Figure 5 reveals the connections between authors, countries, and study themes, showing which authors collaborate with which countries and their primary study focuses. For instance, Andreassen CS often collaborates with the United Kingdom, focusing on anxiety, depression, and mental health, while the USA is a major collaborator with diverse study topics such as adolescents, social support, and social media.

This visual representation provides an overview of key participants, collaborating countries, and study focuses, helping study identify main study forces and future directions, and promoting cross-border academic exchange and collaboration.

3.5 Analysis of research and development trends

Table 1 provides a detailed compilation of the keywords from the published study papers, their respective clusters, and their centrality within the study network. This table aids in understanding the study focus and developmental trends in

the field of adolescent mental health. The distribution of these study development trends is illustrated in Figure 5.

Table 1. Keywords in study outputs, their clusters, and betweenness centrality

Occurrences	Words	Cluster	Cluster_Label	btw_centrality
4	disorder	1	disorder	424.816
3	care	1	disorder	462.141
3	impact	1	disorder	181.954
2	psychological	1	disorder	150.773
2	stress	1	disorder	909.174
2	experience	2	experience	33.962
2	school	2	experience	172.42
2	students	2	experience	282.802
18	anxiety	3	anxiety	8,265.634
10	adolescents	3	anxiety	4,267.431
9	depression	3	anxiety	1,496.768
8	social	3	anxiety	1,443.865
4	disorders	3	anxiety	353.473
3	media	3	anxiety	301.595
2	aggressive	3	anxiety	40.121
2	life	3	anxiety	187.975
2	sample	3	anxiety	179.655
2	spanish	3	anxiety	152.209
2	symptoms	3	anxiety	373.105
2	treatment	3	anxiety	258.237
23	teenage	4	teenage	12,039.231
6	adolescent	4	teenage	1,791.615
6	adult	4	teenage	930.83
5	mental	4	teenage	485.281
5	health	4	teenage	456.15
5	mothers	4	teenage	639.322
5	pregnancy	4	teenage	598.135
5	study	4	teenage	1,391.066
4	children	4	teenage	446.104
4	girls	4	teenage	810.231
4	prevalence	4	teenage	426.668
2	cancer	4	teenage	36.64
3	cross-sectional	4	teenage	663.558
2	addiction	4	teenage	441.165
2	cfsme	4	teenage	0
2	context	4	teenage	233.73

(Continued)

Table 1. Keywords in study outputs, their clusters, and betweenness centrality *(Continued)*

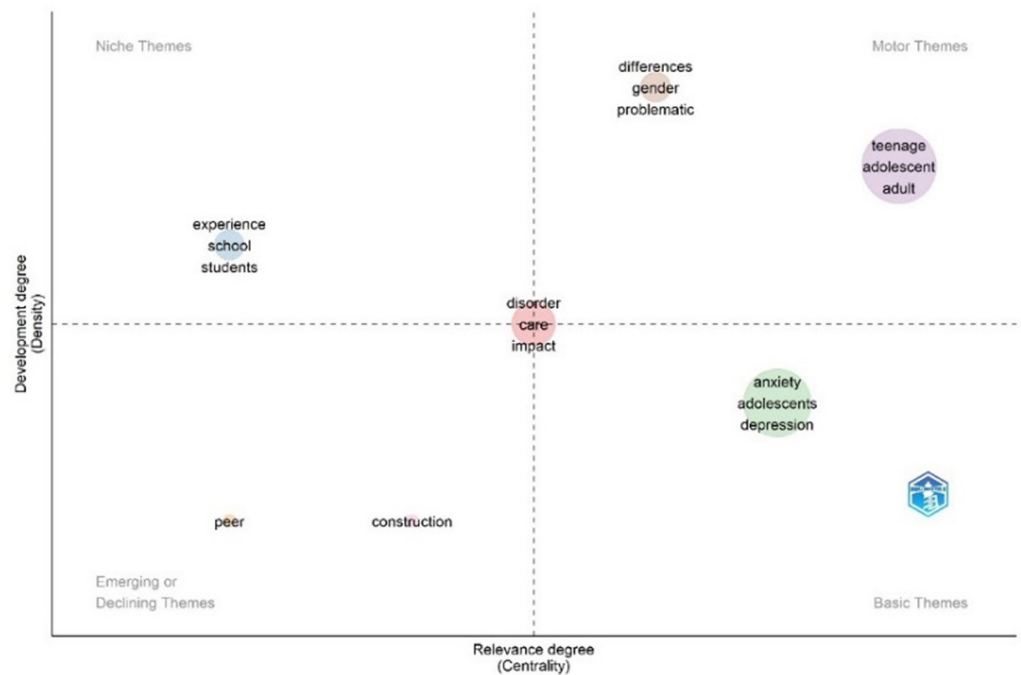| Occurrences	Words	Cluster	Cluster_Label	btw_centrality
2	effect	4	teenage	434.045
2	factors	4	teenage	97.606
2	outcomes	4	teenage	334.838
2	parents	4	teenage	101.626
2	postpartum	4	teenage	224.992
2	pregnant	4	teenage	122.73
2	results	4	teenage	263.746
2	review	4	teenage	222.895
2	systematic	4	teenage	222.895
2	peer	5	peer	1,458.000
2	differences	6	differences	201.433
2	gender	6	differences	201.433
2	problematic	6	differences	417.257
2	construction	7	construction	3.85

Fig. 6. Distribution of study focus and development trends

Discussion:

Based on Table 1 and Figure 6, we analyze the occurrences, clusters, and centrality of keywords in study on social media's impact on adolescent mental health.
Cluster Analysis

1. Cluster 1: Disorder: Keywords such as "disorder" (4 occurrences), "care" (3), "impact" (3), "psychological" (2), and "stress" (2) are prominent. "Stress" has the highest centrality (909.174), indicating its key role in study related to disorders.

2. Cluster 2: Experience: This cluster includes "experience" (2 occurrences), "school" (2), and "students" (2). "Students" has the highest centrality (282.802), highlighting its significance in this cluster.
3. Cluster 3: Anxiety: Major keywords include "anxiety" (18 occurrences), "adolescents" (10), "depression" (9), "social" (8), and "disorders" (4). "Anxiety" (8,265.634) and "adolescents" (4,267.431) have very high centralities, underscoring their importance in anxiety study.
4. Cluster 4: Teenage: Keywords are "teenage" (23 occurrences), "adolescent" (6), "adult" (6), "mental" (5), and "health" (5). "Teenage" has a very high centrality (12,039.231), indicating its central role in study.
5. Cluster 5: Peer: The keyword "peer" appears twice with a centrality of 1,458.000, highlighting its significance in the study network.
6. Cluster 6: Differences: The keywords "differences" and "gender" each appear twice, with a centrality of 201.433, showing their intermediary importance.
7. Cluster 7: Construction: "Construction" appears twice with a lower centrality of 3.85, indicating less influence in the study network.

Insights:

The analysis reveals that anxiety and adolescence are central themes in current study, with high occurrences and centralities emphasizing their importance. Other significant areas include peer influence, gender differences, and the psychological impacts of disorders. These insights help identify key study focuses and trends, guide future studies, and facilitate targeted study initiatives.

3.6 International collaboration analysis

Figure 7 provides insights into the extent and nature of international collaboration in study on the impact of social media on adolescent mental health. The analysis reveals the patterns and scale of cross-country partnerships, highlighting how researchers from different countries work together in this field.
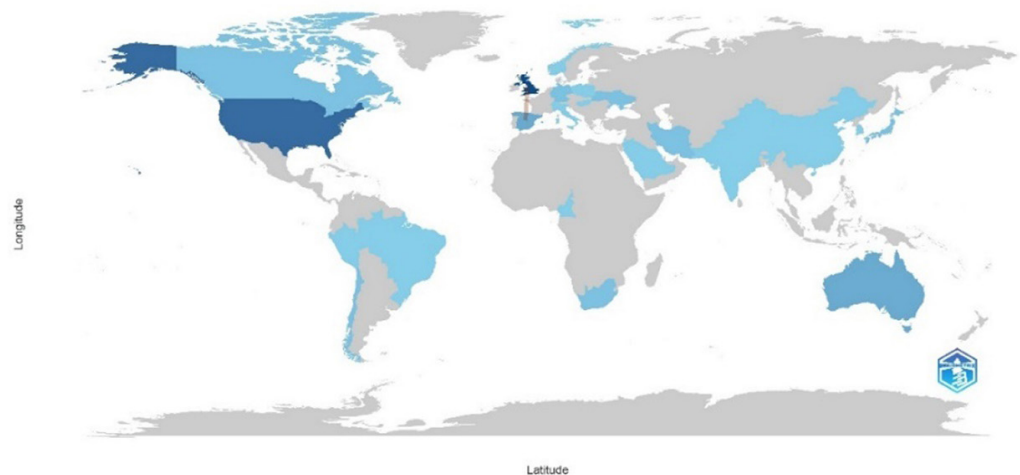

Fig. 7. Analysis of international collaboration in study on the impact of social media on adolescent mental health

Discussion:

Figure 7 illustrates significant international collaboration in study on the impact of social media on adolescent mental health, showcasing extensive cross-country partnerships.

Key collaborator: United Kingdom: The United Kingdom plays a central role, collaborating with Canada, Chile, Hungary, Italy, Norway, South Africa, and Spain. Notably, the UK-Spain partnership stands out with three joint publications, reflecting a strong and ongoing study relationship.

Other collaborations: Other international collaborations are more isolated, with each pair of countries partnering only once. Examples include South Korea with India, Nepal with India, Nepal with South Korea, South Africa with Italy, Switzerland with Cameroon, and Ukraine with Poland. These single-link partnerships suggest a lower density of collaboration compared to the UK-Spain relationship.

Insights: The data highlights substantial international engagement in this study field, with the UK at the center of these collaborations. The strong UK-Spain partnership indicates a deep and productive study relationship, contributing diverse perspectives and enhancing study robustness. Broader international collaborations enrich the study landscape by integrating findings from various countries, promoting methodological and theoretical exchanges, and offering more comprehensive insights into social media's impact on adolescent mental health.

4 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

This study examined international collaborations and keyword networks to assess the impact of social media on adolescent mental health. The analysis highlighted prominent keywords such as "anxiety," "adolescents," "depression," "social," and "anxiety disorders," underscoring the significant role of anxiety and depression among adolescents. Additionally, the study revealed key international partnerships, particularly between the UK and countries such as Spain, Norway, and South Africa, emphasizing the global relevance of addressing adolescent mental health issues.

4.2 Recommendations

Future study directions

1. Future study should adopt a multicultural approach by including data from diverse countries to understand cultural variations in adolescent mental health. Longitudinal studies are essential for tracking changes over time and evaluating the long-term effects of social media. Interdisciplinary collaboration among psychology, sociology, and public health will yield more comprehensive insights and solutions.
2. Schools and parents need to enhance media literacy education to guide adolescents in using social media responsibly, reducing the risks of anxiety and depression. Governments should improve mental health resources, including counseling and support groups, to address social media-related psychological issues.

3. Regulations on social media platforms should be strengthened to limit harmful content. Promoting international study collaborations will facilitate data sharing and advance global study. Finally, coordinated international policies are needed to protect adolescent mental health and tackle global challenges.

Summary: Addressing the impact of social media on adolescent mental health requires international cooperation, interdisciplinary study, and comprehensive policy support. Future efforts should focus on diverse cultural contexts, long-term studies, and practical interventions to enhance mental health protection and support for adolescents.

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