

REVIEW

Exploring the impact of cyberbullying on mental health through social media: A visualization and trend analysis

Exploración del impacto del ciberacoso en la salud mental a través de las redes sociales: Visualización y análisis de tendencias

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ABSTRACT

Introduction: cyberbullying on social media has become a major concern due to its severe impact on mental health, particularly among adolescents. The intersection of cyberbullying, social media, and mental health has attracted increasing scholarly attention, especially during the COVID-19 pandemic, which intensified online interactions and their psychological consequences.

Objectives: this study aims to conduct a bibliometric analysis of research trends on cyberbullying, social media, and mental health from 2014 to 2024, identifying key themes, influential authors, leading journals, and emerging research patterns.

Method: a dataset of 203 documents was retrieved from Scopus and analyzed using Biblioshiny and VOSviewer. The analysis included keyword co-occurrence mapping, citation analysis, authorship trends, and global collaboration networks.

Results: findings reveal a 36,22 % annual growth rate in publications, highlighting increasing academic interest. Core research themes include depression, anxiety, and suicidal ideation, with artificial intelligence (AI) and machine learning emerging as tools for cyberbullying detection and mitigation. The United States, United Kingdom, and Germany lead international collaboration. The COVID-19 pandemic significantly influenced research trends, amplifying discussions on mental health impacts.

Conclusions: this study underscores the need for interdisciplinary approaches integrating technology, psychology, and public health to develop effective interventions against cyberbullying. Future research should focus on long-term psychological effects, AI-driven prevention, and policy frameworks. Strengthening global collaboration is crucial to addressing the evolving challenges of cyberbullying in the digital age.

Keywords: Cyberbullying; Social Media; Mental Health; Bibliometric Analysis; Biblioshiny; VOSviewer.

RESUMEN

Introducción: el ciberacoso en las redes sociales se ha convertido en una de las principales preocupaciones debido a su grave impacto en la salud mental, especialmente entre los adolescentes. La intersección del

ciberacoso, los medios sociales y la salud mental ha atraído cada vez más la atención de los estudiosos, especialmente durante la pandemia del COVID-19, que intensificó las interacciones en línea y sus consecuencias psicológicas.

Objetivos: este estudio tiene como objetivo realizar un análisis bibliométrico de las tendencias de investigación sobre ciberacoso, medios sociales y salud mental desde 2014 hasta 2024, identificando temas clave, autores influyentes, revistas líderes y patrones de investigación emergentes.

Método: se recuperó un conjunto de datos de 203 documentos de Scopus y se analizaron utilizando Biblioshiny y VOSviewer. El análisis incluyó mapeo de co-ocurrencias de palabras clave, análisis de citas, tendencias de autoría y redes globales de colaboración.

Resultados: los resultados revelan una tasa de crecimiento anual de las publicaciones del 36,22 %, lo que pone de relieve el creciente interés académico. Los principales temas de investigación incluyen la depresión, la ansiedad y la ideación suicida, con la inteligencia artificial (IA) y el aprendizaje automático emergiendo como herramientas para la detección y mitigación del ciberacoso. Estados Unidos, Reino Unido y Alemania lideran la colaboración internacional. La pandemia COVID-19 influyó significativamente en las tendencias de investigación, amplificando los debates sobre los impactos en la salud mental.

Conclusiones: este estudio subraya la necesidad de enfoques interdisciplinarios que integren la tecnología, la psicología y la salud pública para desarrollar intervenciones eficaces contra el ciberacoso. La investigación futura debería centrarse en los efectos psicológicos a largo plazo, la prevención impulsada por la IA y los marcos políticos. Reforzar la colaboración mundial es crucial para afrontar los retos cambiantes del ciberacoso en la era digital.

Palabras clave: Ciberacoso; Redes sociales; Salud mental; Análisis bibliométrico; Biblioshiny; VOSviewer.

INTRODUCTION

With the rapid growth of social media, the ways in which people communicate and interact with one another have radically changed. While it had several advantages, it also provided venues for cyberbullying, which is very destructive to mental health, especially in adolescents. Cyberbullying has emerged as a serious public health issue in which alone or in combination, significant evidence links this to many forms of mental health problems: depression, anxiety, and suicidality. A systematic review by Hamm et al. reported consistent findings for the association between cyberbullying and depression among children and adolescents. Mixed findings have also been reported regarding the association of cyberbullying, anxiety, self-harm, and suicidality. This research underlines the importance of learning the implications that online harassment might have on mental health, especially among younger populations.⁽¹⁾

Bottino et al. found that among victims and perpetrators, more emotional, psychosomatic, and social problems were related to depressive symptoms and suicidal behaviors.⁽²⁾ These findings are in line with the evidence about the particularly negative impact online harassment could exert on adolescents' psychological health.^(1,2) Recently, Javed et al. investigated the ever-increasing influence of social media on the mental health of all young and adult individuals and attributed the significant rise in emotional distress to the prevalence of cyberbullying. They projected that more than 330 million people may be affected by internet addiction until the year 2023, which in turn will further escalate the risks of mental impacts due to cyberbullying again.⁽³⁾ This means there is an emerging need for specific interventions.

Accordingly, among these, social media platforms such as Facebook, Instagram, and Twitter still figure well in research on cyberbullying. These anonymous and all-pervading media promise that bullying behavior extends past the physical walls of school and home. Deol and Lashai noted that through the COVID-19 pandemic period, the increased level of online activities added to the increase in cyberbullying incidence, which further heightened anxiety, depression, and suicidal rates among adolescents. This increase is partly explained by the fears and anger projected in terms of online aggression.⁽⁴⁾ Chen discussed the complicated interplay between social media use, cyberbullying, and depression. His findings indicated that social media adds to the magnitude and intensifies bullying, particularly for younger victims, which increases mental health problems like anxiety and depression.⁽⁵⁾ Likewise, Collantes et al. pointed out that the omnipresence of social media platforms has made cyberbullying an issue that many young people cannot avoid. Their work discovered there is a clear link between cyberbullying and lower self-confidence which leads to serious psychological trauma among victims.⁽⁶⁾

In this longitudinal study, Fahy et al. reported that as a source or target of cyberbullying, adolescents take a very depressive outlook on life with social anxiety throughout their time. This study examined the after-effects of cyberbullying among victims during a later stage of life and called for early intervention strategies.⁽⁷⁾ At recent times, in 2022, Joshi et al. proposed a deep learning framework for detecting cyberbullying on social media. Their study emphasized the role of technological interventions in identifying cyberbullying and thus acting against it before mental health is certainly harmed.⁽⁸⁾

The role of the bystander in any incident of cyberbullying is considered very significant. Bastiaensens et al., on the other hand, conducted an experimental study showing that bystanders were more likely to help the victim if the incident of cyberbullying was severe. However, when the bystanders were close friends with the bully, they were more inclined towards reinforcing the behavior of the latter.⁽⁹⁾ Marengo et al. also identified social support as playing a protective role in reducing negative outcomes associated with cyberbullying. Their findings revealed that adolescents with strong social support were unlikely to develop severe mental health issues resulting from cyberbullying; this raises an issue of nurturing supportive environments.⁽¹⁰⁾

Cyberbullying is a widespread issue in today's technological era, with acceptable consequences on mental health. Research findings have consistently established the correlation between cyberbullying and depression, anxiety, suicidal ideation, and other relevant mental health concerns. Social media serves dual purposes: one as tools for interaction and the other as vectors that amplify cyberbullying behaviors. The protective factors include social support and early detection through technological interventions. With cyberbullying continuing to change as technology itself changes, more research is necessary along with comprehensive interventions in this arena to protect mental health, particularly for vulnerable populations.

Bibliometric research is a quantitative approach in which the scholarly literature of any field is examined and evaluated.^(11,12,13) As the name suggests, it requires using statistical applications in testing volume, such as citation patterns, authorship, collaboration networks, and keyword trends.^(14,15) Bibliometric analysis enables the mapping of the domain of research concerning its growth, structure, and dynamics; further, the identification of main contributors and emergent trends or gaps in the literature can be given.^(16,17)

Biblioshiny is an online interactive web interface for the R-package Bibliometrix, comprehensive for bibliometric analysis.⁽¹⁸⁾ It allows users to access advanced bibliometric techniques in a friendly way that may visualize, explore, and analyze scholarly data without any heavy programming knowledge.^(18,19,20) With Biblioshiny, the researcher can create visualizations like thematic maps, collaboration networks, or co-authorship analysis that may help in observing general trends and relationships within large datasets.^(21,22)

VOSviewer is another potent tool to build and visualize bibliometric networks but finds widespread use in practice.^(23,24) COVID-19 has aroused great concern in the last few months and a growing number of related researches have been published. Therefore, a bibliometric analysis of these publications may provide a direction of hot topics and future research trends.

Methods: The global literatures about COVID-19 published between 2019 and 2020 were scanned in the Web of Science collection database. "COVID-19" "Novel Coronavirus" "2019-nCoV" and "SARSCoV-2" were used as the keywords to reach the relevant publications. VOSviewer was applied to perform the bibliometric analysis of these articles.

Results: Totally 3 626 publications on the topic of COVID-19 were identified and "COVID-19" with a total link strength of 2 649 appeared as the most frequent keyword, which had a strong link to "pneumonia" and "epidemiology". The mean citation count of the top 100 most cited articles was 96 (range, 26-883). One can visualize co-authorship networks, keyword co-occurrence, or even citation relationships in finer detail, easing the task of comprehending the structure and connectivity of a field.^(25,26) VOSviewer works well with large datasets, and its visual output presents intuitive mapping that supports the identification of key areas of research and collaboration, influential authors, institutions, and emerging research topics.^(27,28)

The main goal of this paper is to conduct a thorough bibliometric analysis of research on cyberbullying, social media, and mental health for the period between the year 2014 and 2024. It will explore prevailing trends, most prolific authors, key journals, and collaborative networks while highlighting fast-rising themes and even technological advancements in which the use of artificial intelligence and machine learning with regard to the perpetration of cyberbullying and its outcomes on mental health will become pervasive. Additionally, the study seeks to understand the global distribution of research contributions and co-authorship patterns across countries, providing insights into the evolving nature of scholarly discourse surrounding these critical issues.

The increasing prevalence of cyberbullying through social media poses a significant threat to mental health, particularly among adolescents and young adults. Despite the increasing volume of research on the topic, a gap remains in the understanding of the broader academic landscape, research emerging trends, and the potential of technological intervention in the fight against cyberbullying. The present study fills the gap by conducting an exhaustive bibliometric study to identify major research topics, leading authors, and changing trends in the research subject. Through intellectual mapping of the research subject area, the study aims to provide insightful information for scholars, policymakers, and mental health professionals to guide the development of more effective intervention and prevention strategies.

METHOD

In this study, Scopus was selected as the primary source of bibliographic data due to its extensive and diverse repository of high-quality academic publications, offering a broader and more comprehensive coverage compared to other databases. Scopus is widely recognized for its reliability and inclusiveness, making it an ideal platform for capturing a diverse range of research outputs across disciplines. The search for relevant literature focused on the keywords "Cyberbullying," "Social Media," and "Mental Health," without imposing

language restrictions, ensuring the inclusion of studies from various linguistic contexts, thus enhancing the global relevance of the analysis. The search was refined to include journal articles, book chapters, and conference papers, which typically represent substantial contributions to academic discourse. A total of 203 documents from 146 sources, spanning the years 2014 to 2024, were retrieved, providing a robust foundation for the bibliometric analysis. The dataset was further refined by excluding reviews, editorials, letters, notes, and short surveys, as these formats generally do not contribute original research. The final dataset, consisting exclusively of articles, book chapters, and conference papers, was saved in CSV format for analysis using VOSviewer and Biblioshiny, ensuring a comprehensive and methodologically rigorous bibliometric examination.

The bibliometric data presented in Table 1 offers a comprehensive overview of the research landscape on the intersection of cyberbullying, social media, and mental health between 2014 and 2024. A total of 203 documents were sourced from 146 different journals, books, and other academic publications, reflecting an impressive annual growth rate of 36,22 %, indicative of the increasing scholarly interest in this area. The average document age of 2,27 years highlights the relatively recent and evolving nature of this field. On average, each document received 13,45 citations, suggesting that these works are garnering considerable academic attention. With a total of 9,302 references cited across the documents, this research area draws on a broad and diverse body of existing literature. The keyword analysis reveals a significant breadth of topics, with 1 198 Keywords Plus and 524 author-provided keywords, pointing to a wide-ranging scope of research themes. Notably, the analysis involved 835 unique authors, of whom 15 contributed single-authored papers, underscoring the collaborative nature of research in this domain. The average number of co-authors per document is 4,27, and international collaborations account for 19,7 % of all co-authorships, further emphasizing the global and interdisciplinary nature of the research. Document types include 149 articles, 20 book chapters, and 34 conference papers, highlighting the prevalence of peer-reviewed articles as the primary medium for disseminating findings in this field. Overall, the data reflects a dynamic and growing research area with significant global collaboration and diverse contributions.

Table 1. Main information of the investigation	
Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2014:2024
Sources (Journals, Books, etc)	146
Documents	203
Annual Growth Rate %	36,22
Document Average Age	2,27
Average citations per doc	13,45
References	9302
DOCUMENT CONTENTS	
Keywords Plus (ID)	1198
Author's Keywords (DE)	524
AUTHORS	
Authors	835
Authors of single-authored docs	15
AUTHORS COLLABORATION	
Single-authored docs	15
Co-Authors per Doc	4,27
International co-authorships %	19,7
DOCUMENT TYPES	
Article	149
Book chapter	20
Conference paper	34
Source: Biblioshiny.	

RESULTS

Annual scientific production

The Annual Scientific Production graph, shown in figure 1, illustrates the upward trend in research output related to cyberbullying, social media, and mental health from 2014 to 2024. The production remained relatively low and stable until 2018, with minimal growth in the number of publications. However, after 2019, there is a noticeable and consistent increase, reflecting the growing scholarly interest in this intersectional field. The steepest rise occurs between 2020 and 2023, likely reflecting an increased focus on mental health issues exacerbated by social media, particularly during the global COVID-19 pandemic, which heightened discussions

around online behavior and mental well-being. The peak appears in 2023, with just over 50 articles published, followed by a slight decline in 2024. This decline might suggest a stabilization of research interest after the pandemic-driven surge. Overall, the data shows a significant upward trend in publications, indicating that the topic has gained considerable attention in recent years, possibly driven by societal shifts in the usage of social media and its impact on mental health.

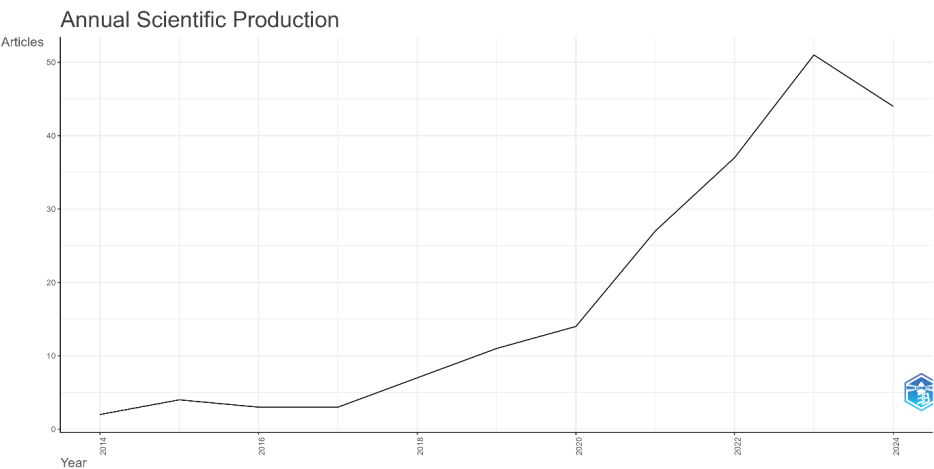


Figure 1. Annual Scientific Production
Source: Biblioshiny

Most Relevant Authors

Table 2 presents the most relevant authors contributing to research on cyberbullying, social media, and mental health. Among the identified authors, Rey L stands out as the most prolific, with a total of three articles published in this area. Several other authors, including Becker-Hebly I, Bickham DS, Bindt C, Borraccino A, Chamizo-Nieto MT, Dalmasso P, Dhillon P, Driver C, and Extremera N, each have contributed two articles. This indicates a relatively even distribution of research contributions among key authors, with no single author dominating the field entirely. The presence of multiple authors with more than one publication highlights a growing and collaborative body of work focused on the complex relationship between cyberbullying, social media, and mental health. Additionally, the diversity of contributors underscores the interdisciplinary and international interest in this critical area of study.

Table 2. Most Relevant Authors	
Authors	Articles
Rey L	3
Becker-Hebly I	2
Bickham DS	2
Bindt C	2
Borraccino A	2
Chamizo-Nieto MT	2
Dalmasso P	2
Dhillon P	2
Driver C	2
Extremera N	2
Source: Biblioshiny	

Most Relevant Sources

Most Relevant Sources in table 3 highlights the academic journals and platforms that have published the most articles related to cyberbullying, social media, and mental health. The International Journal of Environmental Research and Public Health is the leading source, with 22 articles, indicating its strong focus on public health issues, particularly in the context of environmental and social factors impacting mental health. Following this, Frontiers in Psychiatry and Plos One have each contributed 4 articles, reflecting their broad interdisciplinary focus on mental health and psychiatric research. Other journals such as Child and Adolescent Psychiatry and Mental Health, Clinical Child Psychology and Psychiatry, and the Journal of Adolescence have published 3 articles each, showcasing their emphasis on the mental health of younger populations, particularly adolescents, a demographic highly affected by cyberbullying and social media exposure. Additionally, Lecture

Notes in Networks and Systems and Technology and Adolescent Mental Health, with 3 articles each, underscore the increasing recognition of the technological impacts on mental health, particularly through social media. Lastly, the Asian Journal of Psychiatry contributed 2 articles, highlighting the geographic diversity of the research and the importance of studying cyberbullying and mental health across different cultural contexts. These sources reflect the interdisciplinary and global interest in addressing the mental health challenges posed by cyberbullying in the digital age.

Table 3. Most Relevant Sources	
Sources	Articles
International Journal of Environmental Research and Public Health	22
Frontiers in Psychiatry	4
Plos One	4
Child and Adolescent Psychiatry and Mental Health	3
Clinical Child Psychology and Psychiatry	3
Journal of Adolescence	3
Lecture Notes in Networks And Systems	3
Technology and Adolescent Mental Health	3
Asian Journal of Psychiatry	2
Source: Biblioshiny	

Trend Topics

Figure 2 represents the trend topics in research related to cyberbullying, social media, and mental health, showcasing the evolution of key terms and their frequency over time. Among the most prominent topics, mental health is consistently the most frequently mentioned, peaking between 2022 and 2023, reflecting heightened scholarly attention to mental health issues, particularly in the context of social media interactions. Cyberbullying and social media also show significant and consistent research interest, with steady increases in frequency, especially as these issues have become more pressing in recent years. Terms such as adolescents, and adolescence underscore the central focus on youth populations, which are often the most vulnerable to the effects of cyberbullying. Specific psychological issues, like suicide and stress, are also recurring topics, pointing to the severe mental health consequences associated with online harassment and social media pressures. The presence of sexting highlights discussions surrounding risky online behavior linked to cyberbullying and its impact on youth. Emerging technologies, particularly natural language processing and deep learning, have started gaining traction, particularly in recent years. These technologies are being increasingly utilized to better understand and analyze patterns of harmful online behavior and mental health outcomes, demonstrating the application of advanced computational tools in this domain. Overall, the figure illustrates a dynamic field of study with evolving trends, where traditional concerns about youth and cyberbullying are being enriched by the introduction of advanced methodologies and a growing focus on mental health outcomes.

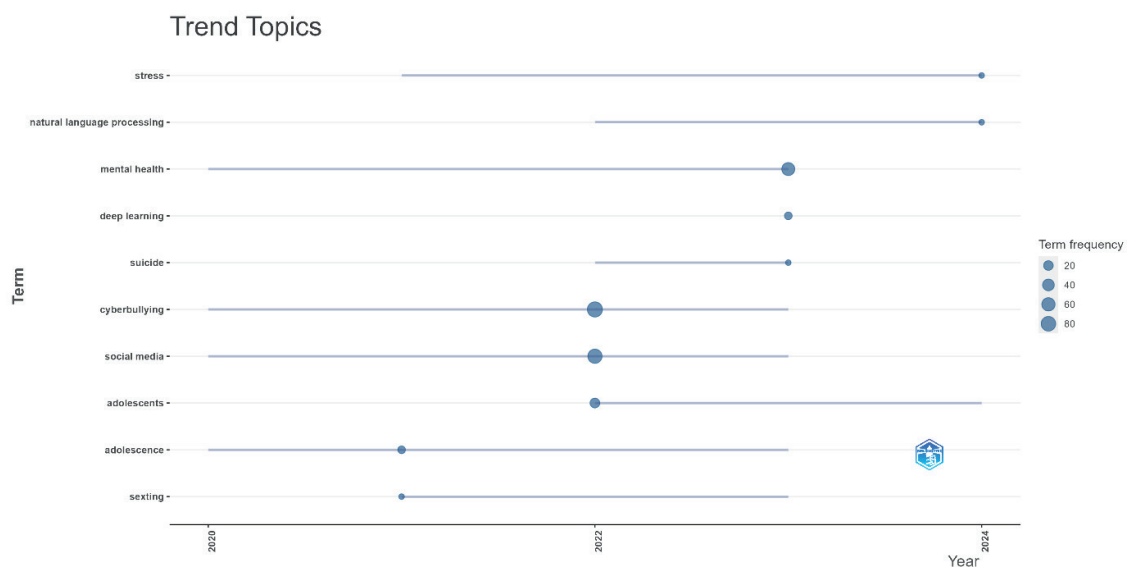


Figure 2. Trend Topics

Source: Biblioshiny

Thematic Map

Thematic map in figure 3 showing the structured visualization of key research themes on the topic of cyberbullying, social media, and mental health, categorized by relevance and development across quadrants. This map aids in assessing the centrality of themes within the research field, emergent or niche areas that contribute to the overall body of work. In the quadrant of Basic Themes, that is, the bottom right, we find core themes which are highly relevant but less developed in respect of the research density. Core topics in this category include cyberbullying, social media, and mental health and illustrate foundational topics, which means they are central within the research discourse but also may still need further exploration and development. Other topics which lie in this quadrant are sexting, Instagram, and internet addiction. These stress the paramount importance of these topics to the thought of psychological effects brought about by the use of social media in the context of harmful practices and mental health issues.

The Motor Themes quadrant includes highly relevant and well-developed themes-driving the research forward-placed top-right. In that respect, the most striking topics are that of adolescence, artificial intelligence, and social comparison. These themes represent very key drivers in current research, especially since studies have been focusing on how social media is affecting adolescent mental health, and the contribution of AI in the analysis and addressing of cyberbullying with associated mental health issues. These themes are likely to keep reflecting future research, regarding both their theoretical and practical importance. The quadrant of Niche Themes allows the identification of highly developed topics, though less central within the framework of the field. Other themes, such as COVID-19 pandemic, cyber-victimization, and online gaming, fall within the more specialized aspects of cyberbullying and mental health. While these constitute important themes in their own contexts, they are not universal themes quite as much as the motor or basic theme. They give insights that are more specific and, quite often, bound to specific situations or groups of people, such as the impact of the pandemic on psychological well-being or the positioning of gaming within social relations.

Finally, the bottom-left quadrant represents the Emerging or Declining Themes and includes themes that are at their development stage or which are losing their prominence. Accordingly, some of the topics which have been placed under this quadrant include cyberbullying, epidemiology, machine learning, deep learning, and natural language processing. In fact, most of these themes are getting highlighted due to the fact that technological tools like AI and machine learning are applied for studying and mitigating the effects of cyberbullying. While they are not yet full participants in the mainstream of research, they are promising areas for future investigation, in particular with regards to the evolving methodology contributing to mental health and social media interaction research. Taken altogether, the thematic map provides an excellent overview of what is happening at present in research, highlighting which topics are driving the field and which are emerging as important areas of focus. This would further help in tracing the evolution of discourse on cyberbullying, social media, and mental health and act as a guideline for the direction that future research may take.

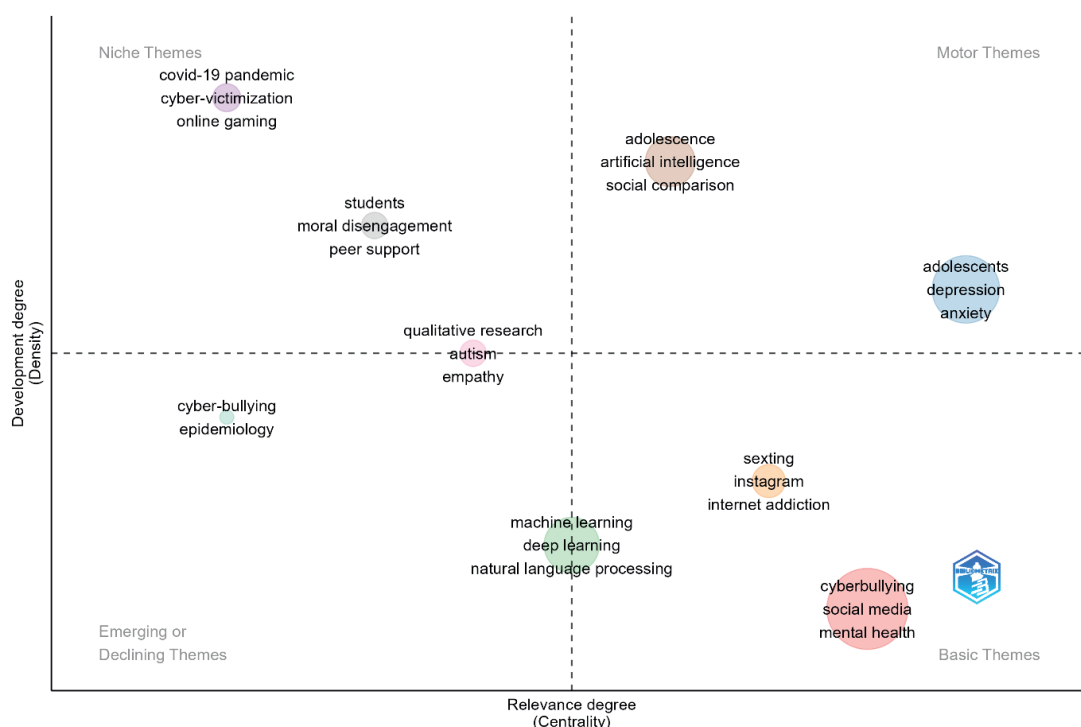


Figure 3. Thematic Map

Source: Biblioshiny

Three Field Plot

Figure 4 furnishes a visualization that affiliates the most important keywords on the left side (DE), the most prolific authors in the middle (AU), and the primary sources on the right position-all linked by lines to show their interactions within the area of research into cyberbullying, social media, and mental health. On the left are the most frequent keywords: internet, social media, cyberbullying, mental health, adolescence, depression, and anxiety. The key words identified point to the core of a focus in research-the intersection of digital platforms and their impact on mental health, especially among adolescents. The middle has authors who have contributed considerable weight to these themes. For instance, authors like Bickham DS, Bindt C, Becker-Hebly I, and Rey L have a high degree of centrality with multiple themes, such as cyberbullying, social media, and mental health; therefore, proving how deeply involved they are in this field of research. This visual shows how every author is connected to various key topics. On the right are underlined sources of their publication, including well-recognized journals such as the International Journal of Environmental Research and Public Health, BMC Psychiatry, and Revista de Psiquiatria Clinica. These journals are essential in communicating research that orbits the dimensions of mental health and online behavior, thus showing the wide diffusion of present works within the scientific environment. Above all, the three-field plot has shown effectively the connections of relevant keywords to key authors and major sources for a general view of how research in this area is structured and diffuse. It has succeeded in highlighting the collaboration and thematic focus that drives scholarly contributions within the areas of cyberbullying, social media, and mental health.

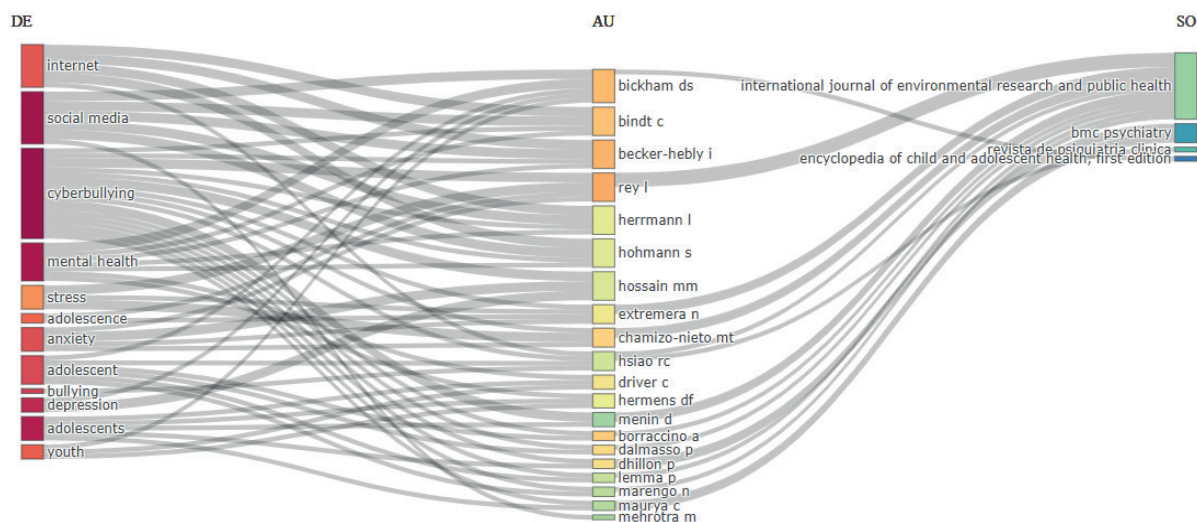


Figure 4. Three-Field Plot of Keywords (DE), Authors (AU), and Sources (SO)
Source: Biblioshiny

This plot visualizes the connections between the most relevant keywords (left), key authors (middle), and primary sources (right) in the research field of cyberbullying, social media, and mental health. It highlights the relationships between these three elements, showcasing how different authors contribute to specific topics and where these contributions are published.

Co-authorship between Countries

Figure 5 shows international collaboration in research into cyberbullying, social media, and mental health through links and collaboration between countries. This provides a visualization of the extent to which research collaboration has taken place across countries worldwide, with some countries being major connectors in research and academic networking. The United States seems to hold a central position in the research landscape, having a great number of collaborative links towards both Canadian, Spanish, Australian, and Indonesian sides. This might be reflected in that the U.S. plays an important role in fostering this international partnership, with substantial contribution to the academic discourses on cyberbullying and mental health. Especially the high connection of the U.S. with Canada sends an indication of a good partnership in the North American region within this domain of research. The United Kingdom also serves as a key player in the network, taking into account the strong connection it has both with the United States and European countries like Italy and the Netherlands. The UK link to India and Malaysia speaks to dedication to research collaborations outside the European continent, especially with Asian countries, reflecting a more diversified international perspective in the case of co-authored works. Germany and the Netherlands are intertwined, reaching out frequently to many users and creating a 'European cluster' in this network perspective. Their connections extend to Malaysia,

therefore, showing a cross-continental collaboration that bridges Europe and Southeast Asia on issues of cyberbullying and mental health research. Besides these major hubs, Italy and India are notable contributors, especially in their links with the UK. India has stronger links with the UK and Italy, this would tend to suggest its research outputs more often emanate from collaboration with European partners.

The green cluster in the visualization, which includes Germany, the Netherlands, and Malaysia, reflects a group of countries that frequently collaborate with each other. This suggests an active network that transcends regional boundaries and emphasizes the importance of international co-authorship. The blue cluster, consisting of India, Italy, and the United Kingdom, shows another important collaboration pattern, focusing on a Europe-Asia connection. This could reflect the increasing research focus on social media's impact in diverse socio-cultural contexts, especially in rapidly growing internet populations like India. Finally, the red cluster, which includes the United States, Canada, Australia, and Spain, represents a North American and Western European research collaboration, with extensions to Australia and Indonesia. This group represents a large part of the global knowledge production on cyberbullying, social media, and mental health. In summary, figure 5 reveals that research in cyberbullying and mental health is characterized by a high degree of international collaboration, with the United States, the United Kingdom, and Germany emerging as key facilitators of co-authorship networks. The map illustrates that while some research clusters are regionally focused, many countries participate in cross-continental partnerships, underscoring the global relevance of this research domain. The visualized relationships between countries show the increasingly interconnected nature of academic research, as scholars across the globe collaborate to address the growing mental health challenges posed by cyberbullying and social media use.

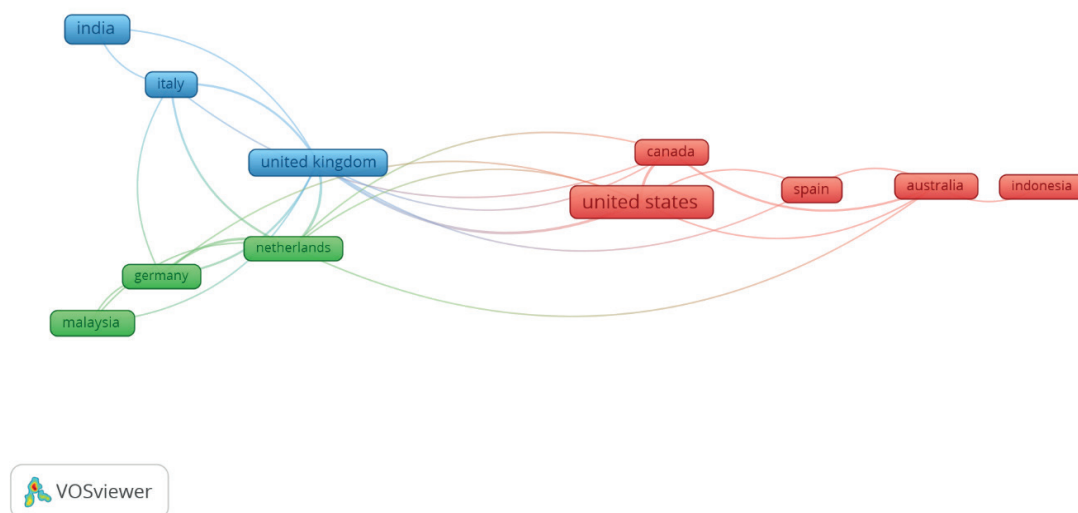


Figure 5. Co-authorship between Countries
Source: VOSviewer

Co-occurrence of keywords

Figure 6 visualizes the relationships between the most frequently used keywords in research on cyberbullying, social media, and mental health. The central terms—social media, cyberbullying, and mental health—are highlighted as core concepts connecting a variety of research themes. Keywords such as adolescent, female, depression, and psychology appear prominently, indicating that much of the research focuses on the mental health impact of social media and cyberbullying on young populations, particularly adolescents and women. The network reveals distinct clusters of related topics. For instance, terms like students, adolescence, and stress form one cluster, suggesting a focus on the impact of cyberbullying on young people's emotional well-being. Another cluster includes technological terms such as machine learning, artificial intelligence, and learning algorithms, reflecting the growing interest in applying advanced computational techniques to analyze and address these issues. Additionally, terms like suicidal ideation, risk factors, and depression emphasize the severe mental health consequences associated with cyberbullying, further underlining the importance of this area of study. The network map also includes public health-related terms such as pandemics and COVID-19, indicating recent research focusing on how these global events have influenced social media behavior and mental health outcomes. Overall, this co-occurrence network demonstrates the interdisciplinary nature of the research, connecting psychological, technological, and public health aspects of cyberbullying and mental health in the context of social media.

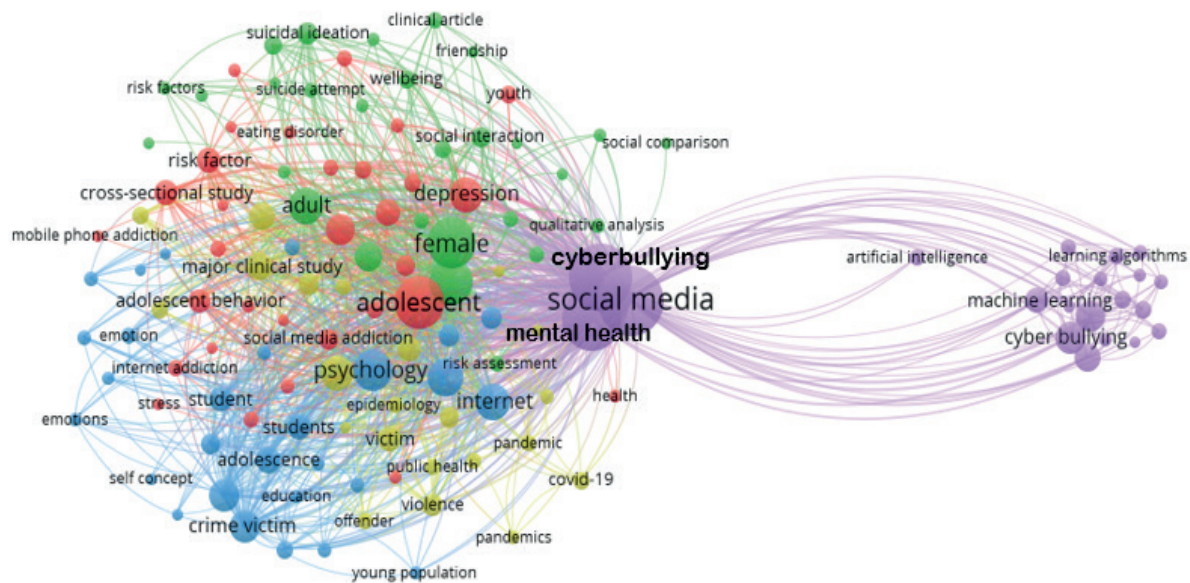


Figure 6. Co-occurrence of keywords
Source: VOSviewer

DISCUSSION

The results of this study offer the most key insights for understanding the actual research landscape on cyberbullying, social media, and mental health. The scientific production, represented by the growth rate and increase in the number of documents over time, shows that this is on an upward trend, reflecting an increase in interest by scholars in this critical area. This is also evinced in the current proliferation of the use of social media, especially among adolescents, as the research community has doubled efforts toward understanding the psychological and behavioral consequences of online interactions, with particular emphasis on the darker aspects of cyberbullying. The co-authorship analysis here underlines global collaboration among the researchers marking a widespread acknowledgment of the gravity in addressing these issues across cultural and national boundaries.

The findings of the present study support the findings of research that have established the strong association of cyberbullying with mental illnesses such as depression and anxiety.^(1,2) Unlike the existing research that was mainly focused on adolescents, the present bibliometric research identifies broader population effects with an emphasis on the need for research across different ages. The COVID-19 surge in cyberbullying research, as reported by Deol & Lashai, and Chen, is corroborated by our study, but our study particularly identifies emerging trends such as the implementation of AI-based interventions.^(4,5) While past research explored psychological coping mechanisms, our study identifies the rising implementation of technology to identify and prevent cyberbullying.^(9,10)

Also, long-term mental health impacts, as evidenced by Fahy et al., validate the requirement for early intervention, which our study corroborates with its global mapping.⁽⁷⁾ Unlike the traditional research that examines cyberbullying at a single point in time, our study presents a ten-year insight, providing a full overview of its shifting impacts. Typically, even though the psychological effects have long been investigated, our study contributes to the discipline by ascertaining research trends, highlighting technological advancements, and emphasizing the multidisciplinary nature of cyberbullying research.

To date, however, there remain several gaps in the literature. Whereas one does find an appreciable volume of studies into the effects of cyberbullying and social media on mental health, unfortunately, a substantial volume of research devoted to the longitudinal effects of prolonged exposure to these platforms has yet to materialize within the literature. Long-term consequences of cyberbullying, in particular with respect to their burden on one's mental health over time, remain understudied to this date. While emerging technologies that apply machine learning and natural language processing in the analysis of cyberbullying patterns begin to gain traction, further research is required to improve accuracy and ethical deployment. In essence, what will be needed is sophisticated algorithms that are capable of making out nuanced behaviors, such as emotional manipulation and social exclusion, which usually are more difficult to detect than overt forms of bullying.

Another important break in the chain is the emphasis on interventions. Much of the research, though conducted to assess the psychic toll of cyberbullying, has far fewer researchers investigate what actually works in the way of intervention strategies. It would be worth going further in the research to really look at practical

evidence-based interventions both at individual and institutional levels that can be interposed to mitigate harm due to cyberbullying. More consideration is needed regarding the role of parents, educators, and policymakers in reducing the impact of cyberbullying, particularly in policy and the implementation of programs on digital literacy to build resilience at a young age.

Future studies should continue to build upon the exploring of how different demographic factors, such as gender, race, and socio-economic status, influence the experience and consequences associated with being cyberbullied. While this study highlights the fact that most of the current studies have been conducted among adolescents and females, some of the other vulnerable groups instituted by LGBTQ+ youths, ethnic minorities, and low-income groups are relatively in the literature below representation. Such knowledge on the different characteristics and difficulties of these populations might therefore lead to targeted intervention strategies.

Beyond this, the conjoined point of mental health and technology-driven interventions shows promise for future research. Artificial intelligence integrated with machine learning for detection and prevention in cyberbullying has been developed relatively recently and is therefore limited; hence, further refinement is being called for. Future researchers are encouraged to impose efforts on enhancing transparency and fairness in algorithms to nullify possible bias and increase mean difference. There is also an urgent need to conduct research into the ethical implications of monitoring and analyzing interactions in social media, particularly in their relations with privacy and consent.

Practical Implications

The practical implications of this study are far-reaching, especially for policymakers, educators, and mental health practitioners. Key identified themes, such as a central focus on adolescence and depression, reveal that access to mental health support services should be more available and youth-focused for those most at risk from cyberbullying. The schools and institutions should integrate digital literacy programs to educate the students on good net citizenship behaviors so as to identify and respond much better when faced with cyberbullying. Above all, mental health professionals also should not look over the increasingly important place that social media take in their patients' lives but include assessment of online interactions as part of their treatment plans.

These findings bring into focus for policymakers the need for legislation that would make the social media platforms accountable on ways of preventing and addressing harmful behavior such as cyberbullying. In fact, the need for stricter regulations relating to data privacy and ethical usage of AI in monitoring Web behavior has never been more critical as a means of protecting people, especially vulnerable youth. The international collaboration reflected in such co-authorship analysis on the topic of cyberbullying basically points to the status of this problem worldwide, thus necessitating concerted efforts at the level of government in developing shared standards and norms among nations.

Last but not least, this research calls into action scholars and researchers to work in committees. The problems associated with cyberbullying and mental health cannot be seen as single-discipline questions; therefore, a wide-ranging approach would include future research on psychology, technology, education, and law for holistic solutions. While social media platforms are changing at a rapid speed, keeping ahead in relation to such changes and their psychological impact would call for continuous and adaptive research.

Thus, while this research is important in terms of improving the state of the art regarding the relationship between cyberbullying, social media use, and mental health, several limitations have also been identified with potential directions for future study. The practical implications point to the need for multi-faceted interventions across sectors, so that as technology evolves, so will the ways of safeguarding mental health in the digital age.

CONCLUSION

This bibliometric analysis has identified a fast-growing body of research at the nexus between cyberbullying, social media, and mental health, with impressive growth in the scholarly output over the last decade. The findings underlined the importance of international collaboration, placing countries such as the United States, the United Kingdom, and even Germany as key loci of research activity. The core themes that come up relate to adolescent mental health, depression, and anxiety, reflecting the focus of the field on psychological impacts that stem from cyberbullying. Emerging technologies in the area include artificial intelligence and machine learning; these seem to mark a movement toward more sophisticated methods of analyzing and addressing online bullying. It also testifies to the growing importance of addressing such issues in an international environment, with contributions from authors representing a vast array of countries. Finally, the review points out that it will be even more relevant in the future to pursue interdisciplinary research and technological development, given that complex problems need elaboration for a deeper understanding and weakening of the mental health issues associated with cyberbullying in the virtual environment.

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CONFLICT OF INTERESTS

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