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THE MATURATION OF A FIELD: A BIBLIOMETRIC ANALYSIS OF DISINFORMATION PREVENTION RESEARCH TRENDS (2014–2024)

Angga Hadiapurwa[1]*, Purnomo[2], Linda Setiawati[3], Diemas Arya Komara[4], Hafsah Nugraha[5]

Library and Information Science, Faculty of Educational Sciences, Universitas Pendidikan Indonesia, Bandung, Indonesia[1,3,5]

Community Education, Faculty of Educational Sciences, Universitas Pendidikan Indonesia, Bandung, Indonesia[2]

Faculty of Communication Science, Universitas Padjadjaran, Sumedang, Indonesia[4]

angga@upi.edu[1], purnomo@upi.edu[2], lindasetiawati@upi.edu[3], diemas24001@mail.unpad.ac.id[4], hafsahnugraha@upi.edu[5]

Corresponding Author*

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ABSTRACT

Disinformation prevention has become a critical field of research, significantly catalyzed by the COVID-19 "infodemic". This study provides a comprehensive bibliometric analysis to map the intellectual structure and evolution of this rapidly expanding field. We analyzed 2,124 articles published from 2014 to 2024, retrieved from the Scopus database. Publication trends, subject distribution, and keyword co-occurrence were analyzed using VOSviewer to identify thematic clusters and temporal shifts. Publication output was negligible until a major inflection point in 2020, surging to a peak of 506 articles in 2022 and rebounding to a new high of 515 in 2024 after a 2023 dip. The field is dominated by three core disciplines: Social Sciences (24.40%), Medicine (24.20%), and Computer Science (10.21%). VOSviewer network analysis revealed two dominant, interconnected thematic clusters: a "Public Health and Vaccine Behavior" cluster (centered on covid, health, and vaccine hesitancy) and a "Media and Disinformation" cluster (centered on medium and fake news). Temporal overlay analysis confirmed the field's evolution from older topics (platforms like twitter) to the central crisis (covid) and finally to emerging, solution-oriented topics (media literacy). The findings conclude that disinformation research, forged in a public health crisis, rests on an interdisciplinary foundation of medicine, social science, and technology. The field is demonstrably maturing, showing a sophisticated scholarly pivot from reactive strategies (fact checking) toward proactive, cognitive interventions such as media literacy to build long-term societal resilience.

Keywords: bibliometric analysis; Covid-19; disinformation; disinformation prevention; fake news; infodemic

INTRODUCTION

In the globally connected digital era, information has become more accessible and quickly disseminated. However, amidst this convenience, there is also a significant challenge in the form of the spread of disinformation or false information. Disinformation, often spread to manipulate public opinion, create confusion, and even damage the reputation of individuals or institutions, has become a severe problem in today's information ecosystem (McKay & Tenove, 2021; Zannettou et al., 2019). The emergence of social media as a primary platform for sharing information has complicated these dynamics, allowing disinformation to spread quickly and widely without adequate validation or verification. The impact of disinformation is not limited to the individual but can have far-reaching consequences for society (Levak, 2020). Other studies also explain that disinformation about political, health, and environmental issues can influence political decisions, spread unnecessary fear or panic, and disrupt crisis management efforts (McLane, 2021). Therefore, preventing disinformation becomes increasingly urgent to maintain the stability and security of information in society.

The spread of disinformation can disrupt essential decision-making processes in everyday life, such as economic or environmental decisions. Widespread disinformation can also influence public policy and business strategies, leading to suboptimal decisions and potentially detrimental to society as a whole (Chan, 2024). Additionally, from an environmental perspective, disinformation about issues such as climate change or conservation can reduce awareness of the importance of environmental protection and encourage actions that are detrimental to the global ecosystem (Ford et al., 2021). Based on this, preventing the spread of disinformation is essential to maintaining the truth of information and protecting the public interest.

Media and information literacy programs have been introduced at various levels of education, from elementary school to college, to equip people with the skills needed to identify disinformation and confirm the truth of information before spreading it further. Improving literacy skills can begin when individuals are of school age through facilities provided by schools, one of which is the school library (Idrus et al., 2025; Komara & Hadiapurwa, 2023). Media and information literacy programs at various levels of education also aim to teach the public about the importance of understanding the context of information (Hadiapurwa et al., 2023; Leaning, 2019; Lee et al., 2025; Park et al., 2021). Media and information literacy programs provide an understanding of how to consider sources of information, evaluate possible biases or partialities in the presentation of information, and identify messages or narratives that may influence perceptions (Farmer, 2019). The existence of this program is expected to strengthen the community's alertness to attempts to manipulate information that aims to influence their attitudes or behavior.

Disinformation prevention strategies include collaboration between social media platforms and authorities to identify, flag, and remove misleading or false content. Despite the challenges, these steps demonstrate a commitment to maintaining the integrity of information in an increasingly complex digital world. Collaboration between social media platforms and authorities can protect the public against disinformation and promote a healthier and more reliable information environment for everyone (Lu et al., 2020).

This study uses bibliometric analysis with a focus on disinformation prevention. The main objective is to understand trends in scientific disinformation prevention publications by

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observing publications from 2014 to 2024. This study aims to conduct a bibliometric analysis of research developments in the field of disinformation prevention, with a focus on identifying research directions, authors, institutions, and key terms that appear in various scientific publications taken from the Scopus database.

Bibliometric analysis is a valuable instrument for providing an overview or visualization of how popular a topic is in scientific publications. Researchers often use this method to explore the trends and impacts of a topic in their scientific discipline. By using bibliometric analysis, researchers can find out how widely the topic of disinformation prevention research is spread, and this can be an essential consideration in determining the direction of further research. The existence of disinformation prevention as a research topic that is increasingly receiving attention shows the urgency of this research in describing and expanding the understanding of how disinformation prevention can be carried out more effectively.

Provide issue and background information about the research topic, statement of the research problem or research question, research objective, and the importance of the study.

LITERATURE REVIEW

Bibliometric Analysis

Bibliometric analysis measures and analyzes various aspects of scientific publications. It aims to understand the patterns found in scientific publication data sets, such as research trends, tendencies of collaboration between authors, and the popularity of specific topics or concepts in a discipline (Liu et al., 2019; Park et al., 2021). By using bibliometric analysis, researchers can generate an understanding of the development of knowledge in a field.

One of the main applications of bibliometric analysis is to explore and map the relationships between scientific articles, both temporally and spatially. This can help identify active research centers, emerging knowledge flows, and collaboration patterns between authors and institutions. By understanding these dynamics, researchers can take more targeted steps to develop further research and increase cross-disciplinary collaboration opportunities. Bibliometric analysis can also provide insight into the popularity and impact of a particular research or topic within the scientific community (Aristovnik et al., 2020). By looking at the number of citations received by an article or collection of articles, researchers can evaluate the level of influence and relevance of a work in its field (Hota et al., 2020). This can be an essential consideration for researchers when determining their research direction and focus.

Bibliometric research can also provide information on publication trends regarding the number of publications per year and the most widely discussed topics. Bibliometric analysis allows researchers to track the development and evolution of certain concepts in scientific publications and identify gaps in knowledge that may be the focus of future research (Foroudi et al., 2021; Goyal et al., 2021). Thus, bibliometric analysis can contribute significantly to directing research directions and broadening understanding in a field of science. In addition to its usefulness in extracting information from scientific publications, bibliometric analysis can also support decision-making at various levels, both in academic and industrial contexts (Budianto & Dewi, 2022). Information on research trends and patterns can identify

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collaboration opportunities, allocate resources more efficiently, and plan future science and technology development strategies.

Disinformation

Disinformation, also known as fake news or hoaxes, refers to information intentionally spreading to mislead or manipulate the public. The phenomenon of disinformation has become increasingly disturbing in the globally connected digital era (Rubin, 2019). With the advancement of technology and easy access to social media, disinformation can spread quickly and widely, creating confusion and influencing public perception. One of the main challenges in dealing with disinformation is its ability to create uncertainty and exploit gaps in information systems to spread false narratives. Disinformation can disrupt societal stability by creating distrust in existing institutions and authorities (Aïmeur et al., 2023; De Paor & Heravi, 2020; Zannettou et al., 2019). In some cases, disinformation can trigger conflict and chaos in society, especially when the false information triggers strong emotional reactions from the public (Serrano-Puche, 2021)Therefore, the spread of disinformation threatens not only the integrity of information but also the peace and security of society.

The level of vulnerability to disinformation can also vary depending on the level of digital literacy and the criticality of individuals in sorting out the information received. Individuals less skilled in verifying the truth of information tend to be more vulnerable to the spread of disinformation (Beauvais, 2022; Bryanov & Vziatysheva, 2021). Therefore, media and digital literacy education is essential in building community resilience against disinformation.

Disinformation Preventing

Preventing disinformation is becoming increasingly important in the digital era when information is rapidly and widely spread. One primary approach to preventing disinformation is through media and digital literacy education (Dame Adjin-Tettey, 2022; Dumitru et al., 2022). Previous research has shown that through literacy education, people are taught to be more critical and intelligent in evaluating the information they encounter, understanding the sources of information, and recognizing the signs of disinformation (Reem, 2022). The public can help by spreading accurate and reliable information and educating others on identifying disinformation. The public has a responsibility not to spread information that they doubt the truth of and to always verify the authenticity of information before sharing it further so that by increasing individual awareness and intelligence, we can form a society that is more resilient and resistant to the spread of disinformation (Chambers, 2021; Duffy et al., 2020; Haque et al., 2020).

Mainstream media is responsible for presenting accurate and reliable information to the public and conducting careful fact-checking before uploading or broadcasting news. It also plays a role in reducing the spread of disinformation and strengthening public trust in the information it receives (Tsfati et al., 2020). Mainstream media must also provide educational content and help the public recognize disinformation (Shapovalova, 2020).

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Through educational programs and coverage that focuses on factual explanations, mainstream media can help improve the public's media literacy and strengthen their defenses against the spread of disinformation. By providing more comprehensive access to accurate information and thoroughly verifying facts, mainstream media can be at the forefront of combating the spread of disinformation by processing complex information into parts that are easier for the general public to understand (Brindha et al., 2020; Karduni, 2019). The mainstream media's role in combating disinformation can help reduce trust in false or questionable information and encourage the public to consider more before spreading unverified information.

METHODOLOGY

This study applies the bibliometric analysis method to identify systematic patterns in various types of literature related to disinformation prevention. This method was chosen because it allows researchers to conduct a citation analysis of each article from the database and study the contents of its bibliography (Baas et al., 2020; Tahamtan & Bornmann, 2019)The data used in this study comes from international publications on disinformation prevention from 2014 to 2024, which were taken from the Scopus database. The data was collected by searching for relevant publications using predetermined keywords.

Researchers enforce period as a parameter to produce more in-depth results and use filtration categories such as article title, abstract, and keywords TITLE-ABS-KEY ((disinformation OR misinformation OR "fake news") AND (prevention OR "fact-checking" OR counter* OR "media literacy" OR "digital literacy" OR "information literacy")) AND (LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2023) OR LIMIT-TO (PUBYEAR , 2024)) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (OA , "all")) AND (LIMIT-TO (LANGUAGE , "English")). Bibliometric data such as number of publications per year, journals containing articles, authors, author affiliations, and research subjects are analyzed and described.

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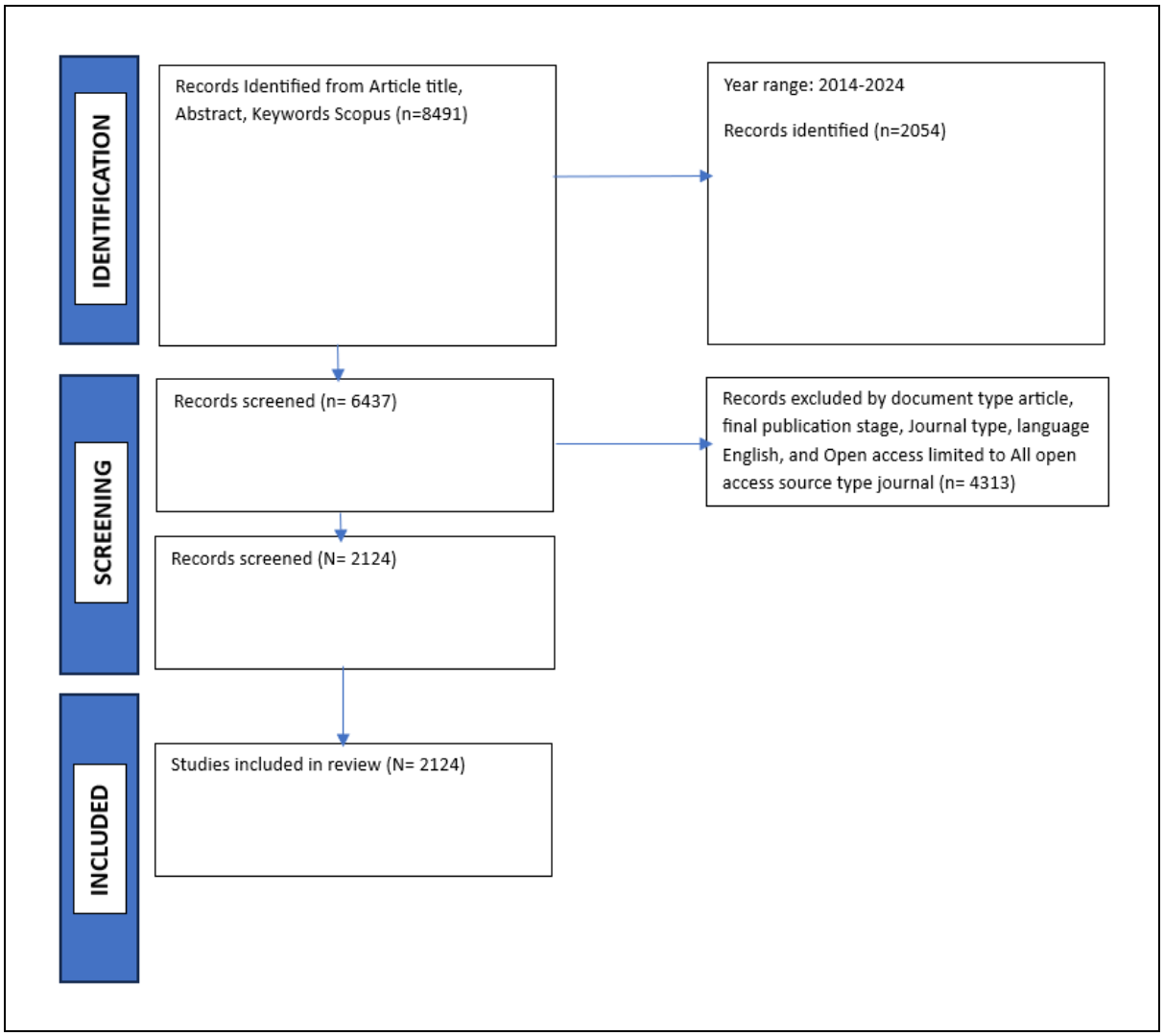

Figure 1. PRISMA Flow Diagram

According the Figure 1 the literature search and selection process began with the Identification of 8,491 records from the Scopus database, which were retrieved using article titles, abstracts, and keywords. An initial filter was applied (implied to be the 2014-2024 year range), which excluded 2,054 records (the difference between 8,491 and 6,437), leaving 6,437 records to advance to the Screening phase. During this screening, a total of 4,313 records were further excluded. The reasons for this exclusion were based on several criteria: document type (non-article), final publication stage, journal type, language (non-English), and a restriction limiting the selection to "All open access source type journal". After this screening process (6,437 minus 4,313), 2,124 records remained. Consequently, all 2,124 of these resulting studies were Included in the final review.

Further visualization and analysis were performed using VOSviewer software. Metadata from the Scopus database was stored in “CSV” format and processed to be visualized in a bibliometric map using VOSviewer. Bibliometric visualization techniques were chosen to map the relationships between journals, author collaborations, and key terms in the literature on disinformation prevention. Three types of visualizations used were network visualization,

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overlay visualization, and density visualization, which help understand the developments related to disinformation prevention in scientific publications.

FINDING

Annual Trend Development of Disinformation Prevention Publications

Table 1 and Figure 1 show the annual trends in publications on disinformation prevention efforts recorded in the Scopus database from 2014 to 2024. The data show the number of articles published each year, the percentage contribution of the total number of articles, and the relative growth rate from year to year.

Table 1. Annual Trends of Disinformation Prevention Publications in Scopus 2014 – 2024

Years	Number of Articles	Percentage	Growth Rate (%)
2014	6	0.28%	-
2015	6	0.28%	0.00%
2016	8	0.38%	33.33%
2017	21	0.99%	162.50%
2018	48	2.26%	128.57%
2019	78	3.67%	62.50%
2020	182	8.57%	133.33%
2021	331	15.58%	81.87%
2022	506	23.82%	52.87%
2023	423	19.92%	-16.40%
2024	515	24.25%	21.75%
Total	2,124	100.00%	

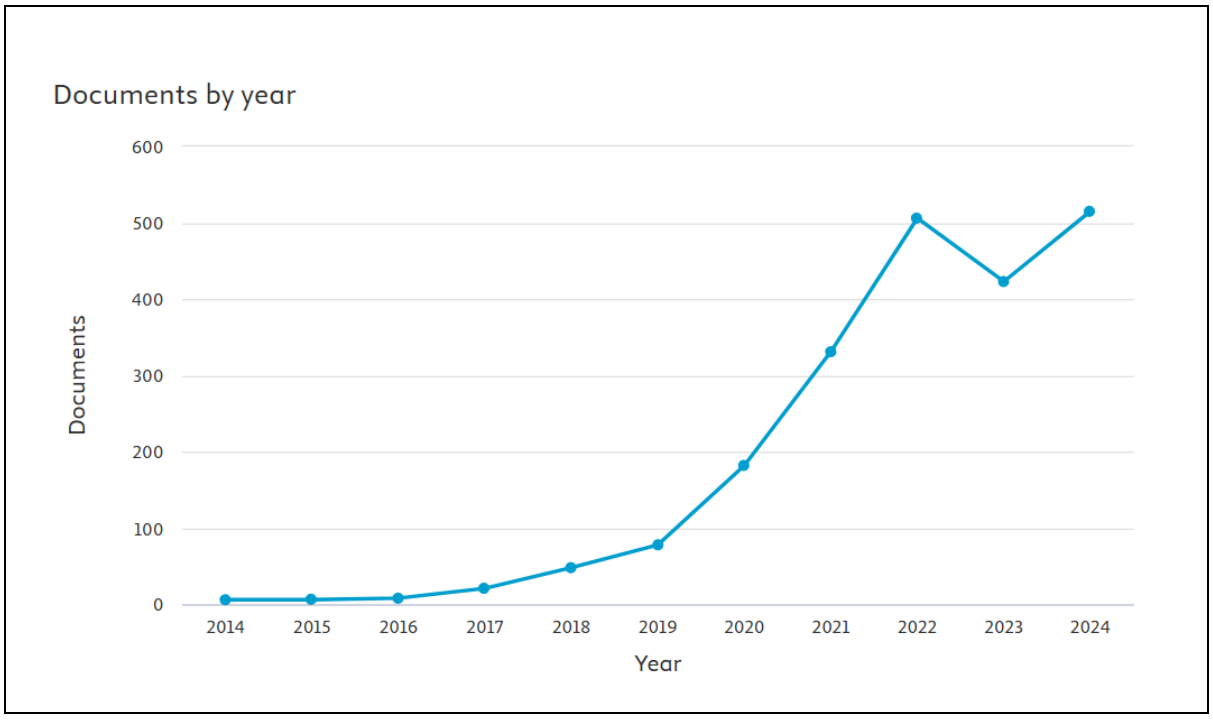

Figure 2. Publication of Disinformation Prevention in Scopus 2014-2024

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An analysis of the annual trends from the 2,124 articles published between 2014 and 2024 in Figure 2 reveals a dramatic evolution of this research field, transforming from a nearly non-existent topic into a major, high-volume area of academic inquiry. During the initial phase from 2014 to 2016, research output was negligible, remaining stagnant at only 6 to 8 articles annually. The field first showed signs of life in 2017, which posted an explosive 162.50% growth rate, followed by another triple-digit surge of 128.57% in 2018. However, the most significant inflection point occurred in 2020. Coinciding with the onset of the global pandemic and the accompanying "infodemic," publications more than doubled from 78 in 2019 to 182 in 2020 (a 133.33% growth). This momentum continued to accelerate exponentially, culminating in a preliminary peak of 506 articles in 2022. The concentration of research in recent years is stark: a remarkable 83.57% of all literature on this topic from the entire decade was published in just the last four years (2021-2024), clearly signaling that this field has become an urgent academic priority in the modern era.

A closer look at the most recent data (2022-2024) illustrates an interesting and volatile dynamic, suggesting a field that is maturing. After reaching an all-time high of 506 articles in 2022, the field experienced its only anomaly of the decade: a significant contraction in 2023, where publications fell to 423, marking a -16.40% decline. This dip could represent a natural market correction following the massive, pandemic-fueled research surge, or a temporary shift in academic focus. However, any concerns that interest had peaked were unfounded. In 2024, the field not only recovered but surged to a new all-time high of 515 articles, a robust 21.75% rebound. This resurgence confirms the topic's sustained and even growing relevance. Collectively, the last three years alone (2022, 2023, and 2024) account for 67.99%—or more than two-thirds—of the total 2,124 publications, underscoring that the field is at its absolute peak of activity and remains a critical focus for the scientific community. During the COVID-19 crisis, accurate and reliable information is essential to guide the decisions of individuals, governments, and organizations (Mansoor, 2021; Wang et al., 2021). However, other research results also show that the pandemic has become fertile ground for spreading disinformation, myths, and detrimental conspiracy theories (Kużelewska & Tomaszuk, 2022).

Distribution of Disinformation Prevention Publication Topics

Table 2. Trends in the Distribution of Disinformation Prevention Publication Topics in Scopus 2014-2024

Rank	Topics	Total (Articles)	Percentage (%)
1	Social Sciences	834	24.40%
2	Medicine	827	24.20%
3	Computer Science	349	10.21%
4	Multidisciplinary	178	5.21%
5	Arts and Humanities	139	4.07%
6	Immunology and Microbiology	123	3.60%
7	Psychology	118	3.45%
8	Engineering	112	3.28%
9	Environmental Science	99	2.90%
10	Pharmacology, Toxicology and Pharmaceutics	82	2.40%
11	Business, Management and Accounting	75	2.19%
12	Biochemistry, Genetics and Molecular Biology	74	2.16%
13	Decision Sciences	52	1.52%

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Rank	Topics	Total (Articles)	Percentage (%)
14	Mathematics	49	1.43%
15	Health Professions	46	1.35%
16	Nursing	46	1.35%
17	Economics, Econometrics and Finance	38	1.11%
18	Veterinary	38	1.11%
19	Materials Science	29	0.85%
20	Agricultural and Biological Sciences	24	0.70%
21	Neuroscience	23	0.67%
22	Physics and Astronomy	21	0.61%
23	Energy	10	0.29%
24	Chemical Engineering	9	0.26%
25	Chemistry	9	0.26%
26	Earth and Planetary Sciences	9	0.26%
27	Dentistry	4	0.12%
Total		3,418	100.00%

An analysis of the distribution across 3,418 publications in Table 2 reveals that research on disinformation prevention is intensely concentrated within a few key disciplines, while simultaneously demonstrating its pervasive impact across the entire academic landscape. The field is overwhelmingly dominated by a "big three": Social Sciences (834 articles, 24.40%), Medicine (827 articles, 24.20%), and Computer Science (349 articles, 10.21%). Together, these three areas account for a clear majority (58.81%) of all published research, highlighting the core nature of the disinformation crisis as a complex interplay of human behavior, public health consequences, and technological amplification. The virtually identical contribution from Social Sciences and Medicine underscores the dual threats of societal-political manipulation and urgent health-related misinformation (such as vaccine hesitancy). Following this top tier, there is a sharp decline in volume to the next cluster of disciplines—including Multidisciplinary (5.21%), Arts and Humanities (4.07%), Immunology and Microbiology (3.60%), and Psychology (3.45%)—which represent the broader, secondary impacts of the problem. The presence of specialized medical fields like Immunology and Pharmacology reinforces the strong link to health outcomes, while the "long tail" of the distribution, featuring 27 distinct subject areas ranging from Business, Management and Accounting (2.19%) down to highly specific fields like Veterinary (1.11%) and Dentistry (0.12%), demonstrates that disinformation is a systemic, cross-cutting issue whose effects are being studied in nearly every corner of academia.

Table 3. Publications with the Most Number of Citations

Rank	Authors	Title	Year	Citations
1	Rajkumar, R.P.	COVID-19 and mental health: A review of the existing literature	2020	2,510
2	Loomba et al.	Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA	2021	1,260
3	Puri et al.	Social media and vaccine hesitancy: new updates for the era of COVID-19 and globalized infectious diseases	2020	879
4	Shao et al.	The spread of low-credibility content by social bots	2018	850
5	Romer & Jamieson	Conspiracy theories as barriers to controlling the spread of COVID-19 in the U.S.	2020	809

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6	Islam et al.	COVID-19-Related infodemic and its impact on public health: A global social media analysis	2020	783
7	van der Linden et al.	Inoculating the Public against Misinformation about Climate Change	2017	707
8	Pennycook et al.	Shifting attention to accuracy can reduce misinformation online	2021	695
9	Scheufele & Krause	Science audiences, misinformation, and fake news	2019	651
10	Chan et al.	Debunking: A Meta-Analysis of the Psychological Efficacy of Messages Countering Misinformation	2017	607

The list of the top ten most-cited publications in Table 3 reveals the overwhelming impact of the COVID-19 pandemic as the primary catalyst for research in this field. An astonishing five of the top six articles, all published in 2020 or 2021, are directly related to the pandemic, demonstrating a massive and rapid scholarly mobilization. The top-ranked article by Rajkumar (2020), with a commanding 2,510 citations, highlights the profound secondary crisis of "COVID-19 and mental health," its citation count nearly double the second-place entry. The subsequent cluster of pandemic-era papers (Islam et al., 2020; Loomba et al., 2021; Puri et al., 2020; Romer & Jamieson, 2020), pivots to the informational crisis, or "infodemic." These highly-cited works form a cohesive narrative, examining the mechanics of vaccine misinformation and hesitancy, the role of social media, and the tangible impact of conspiracy theories as barriers to public health responses. The rapid accumulation of thousands of citations for these articles in just a few years underscores their foundational importance and the urgent, real-world necessity of understanding the intersection of a public health emergency and a global misinformation crisis.

Beyond the immediate shadow of the pandemic, the remaining half of the list identifies the foundational pillars and core mechanics of misinformation research that pre-date COVID-19. These articles explore how misinformation works and how to fight it. On the mechanics side, Shao et al. provides a critical technological perspective, identifying the disproportionate role of "social bots" in amplifying "low-credibility content" (Shao et al., 2018), while Scheufele and Krause analyze the human component of "science audiences" and "fake news" (Scheufele & Krause, 2019). The other articles on the list are distinctly solutions-oriented. Chan et al. offers a meta-analysis on the efficacy of "debunking" as a reactive strategy (Chan et al., 2017), whereas van der Linden et al. presents the proactive strategy of "inoculating" the public against misinformation, using climate change as a key example (Van Der Linden et al., 2017). Finally, Pennycook et al. bridges both themes by offering a scalable psychological intervention, suggesting that "shifting attention to accuracy" can effectively reduce the spread of misinformation online (Pennycook et al., 2021). Together, this list illustrates a field of study built on understanding both the mechanisms of viral deception and the cognitive interventions needed to counter it.

Table 4. Literature Review for Disinformation Prevention

Author(s) & Year	Article Title	Study Aim / Objective	Methodology	Key Findings
Rajkumar, R.P. (2020)	COVID-19 and mental health: A review of the existing	To summarize the existing literature on mental health concerns related	Narrative Review. Searched the PubMed database for articles related	Preliminary evidence suggests symptoms of anxiety and depression (16–28%) and self-

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	literature	to the COVID-19 pandemic.	to COVID-19 and mental health.	reported stress (8%) are common psychological reactions to the pandemic. These issues may also be associated with disturbed sleep.
Loomba, S. et al. (2021)	Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA	To quantify how exposure to online misinformation about COVID-19 vaccines affects an individual's intent to be vaccinated.	Randomized Controlled Trial (RCT). A pre-post exposure study with 8,001 participants (4,000 in UK, 4,001 in USA). Participants were randomly shown either misinformation (treatment) or factual information (control).	Exposure to misinformation reduced the "definite" intent to vaccinate by 6.2 percentage points in the UK and 6.4 in the USA, relative to exposure to factual information. Misinformation that sounded "scientific" was most strongly associated with a decline in vaccination intent.
Puri, N. et al. (2020)	Social media and vaccine hesitancy: new updates for the era of COVID-19 and globalized infectious diseases	To review social media's role in propagating vaccine hesitancy and explore how it might be used to improve health literacy and public trust.	Commentary / Literature Review.	Social media allows users to rapidly create and share content without editorial oversight. This can create "echo chambers". Anti-vaccine content frequently generates greater user engagement than pro-vaccine content. Even brief (5-10 min) exposure to vaccine-critical websites negatively impacts vaccination intentions.
Shao, C. et al. (2018)	The spread of low-credibility content by social bots	To provide systematic, data-based evidence on the role of social bots in spreading low-credibility articles.	Data Analysis. Analyzed 14 million Twitter messages spreading 400,000 articles from 120 low-credibility sources. Used the Hoaxy platform to track claims and Botometer to detect social bots.	Social bots play a disproportionate role in spreading misinformation. Bots amplify this content in the early spreading moments, before an article goes viral. They also target influential users via replies and mentions. Humans are vulnerable and reshare bot-posted content.
Romer, D. &	Conspiracy theories as	To test whether accepting	Two-Wave National	Belief in COVID-related conspiracies was

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Jamieson, K.H. (2020)	barriers to controlling the spread of COVID-19 in the U.S.	COVID-19 conspiracy theories is negatively related to adopting preventive behaviors (e.g., masking) and vaccination intentions.	Probability Survey. Surveyed 1,050 US adults in March 2020 and re-contacted 840 of them in July 2020.	highly stable over time. This belief was inversely related to perceived threat, taking preventive actions, and intention to be vaccinated. Conspiracy beliefs from March predicted subsequent mask-wearing and vaccination intentions in July.
Islam, M.S. et al. (2020)	COVID-19-Related Infodemic and Its Impact on Public Health: A Global Social Media Analysis	To track and analyze COVID-19-related rumors, stigma, and conspiracy theories (an "infodemic") and their impact on public health.	Content Analysis. Analyzed 2,311 reports from 87 countries found on fact-checking sites, Facebook, Twitter, and online news (Dec 2019–April 2020).	82% of the 2,276 rated reports were false. Claims related to illness/transmission (24%), control measures (21%), and treatment (19%). The infodemic led to serious public health consequences, including approximately 800 deaths and 5,876 hospitalizations from drinking methanol as a false "cure".
van der Linden, S. et al. (2017)	Inoculating the Public against Misinformation about Climate Change	To test if it is possible to "inoculate" public attitudes about climate change consensus against the influence of misinformation.	Randomized Online Experiment. A pre-post, between-group design (N=2,167) testing a consensus message (97% of scientists agree) against a misinformation counter-message (the "Oregon Petition") and an "inoculation" message.	The consensus message alone significantly increased perceived consensus (+19.7 points). Misinformation alone decreased it (-9.0 points). When shown together, the misinformation "neutralized" the consensus message. However, the inoculation message successfully preserved up to two-thirds of the consensus message's positive effect.
Pennycook, G. et al. (2021)	Shifting attention to accuracy can reduce misinformation online	To test why people share misinformation, comparing three theories: confusion (they believe it), preference (they	Mixed-Methods. A series of survey experiments (Studies 1-6) and a field experiment on Twitter (Study 7, n=5,379). The intervention	People often share misinformation because their attention is on factors other than accuracy (e.g., partisanship), not because they prefer partisanship over

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		value partisanship), or inattention (they are distracted).	involved a subtle "nudge" to prime the concept of accuracy.	accuracy. There is a large gap between what people rate as accurate and what they share. Simply shifting attention to accuracy ("accuracy nudge") increased the quality of news that users subsequently shared.
Scheufele, D.A. & Krause, N.M. (2019)	Science audiences, misinformation, and fake news	To provide an overview of how and why citizens become (and remain) misinformed about science.	Literature Review / Conceptual Paper.	Being misinformed is a function of both ability (e.g., media literacy) and motivation (e.g., motivated reasoning to protect one's identity). Misinformation persists because corrections can "backfire" by making the false claim more familiar. Furthermore, uncivil online comments (the "nasty effect") can polarize readers and cause them to perceive the underlying (factual) article as biased.
Chan, M.S. et al. (2017)	Debunking: A Meta-Analysis of the Psychological Efficacy of Messages Countering Misinformation	To conduct a meta-analysis on the factors that make debunking messages effective at countering misinformation.	Meta-Analysis. Synthesized 52 experimental samples with a total of 6,878 participants.	Misinformation is highly persistent (persistence effect d = 0.75–1.06). Debunking was *less* effective if audiences first generated their own reasons *supporting* the misinformation. Detailed debunking messages were more effective at correcting misinformation (b = 1.82*), but, surprisingly, were also* associated with *stronger* persistence of the original misinformation (b = 1.06*)*.
				Export to Sheets

The provided literature collectively in Table 4 illustrates the severe, measurable public health consequences of the modern "infodemic," particularly as weaponized during the COVID-19 pandemic. The scale of the problem is vast; a global social media analysis by Islam

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et al. tracking 2,311 reports found that 82% of claims were false (Islam et al., 2020). These falsehoods are not harmless, as the same study linked this "infodemic" to catastrophic real-world outcomes, including approximately 800 deaths and over 5,800 hospitalizations from ingesting methanol as “cure". This health crisis extended beyond physical harm; Rajkumar identified a parallel psychological crisis, with a narrative review linking the pandemic and its surrounding information environment to widespread symptoms of anxiety, depression, and stress (Rajkumar, 2020). This misinformation-fueled environment creates tangible barriers to public health interventions. A two-wave national survey by Romer and Jamieson found that beliefs in COVID-related conspiracy theories were highly stable and directly predicted a lower likelihood of adopting preventive behaviors, including mask-wearing and future vaccination (Romer & Jamieson, 2020).

The mechanisms driving this infodemic are both social and technological, with modern platforms acting as powerful amplifiers. Social media, as described by Puri et al., creates a fertile ground for vaccine hesitancy by operating without editorial oversight and allowing users to self-segregate into "echo chambers" (Puri et al., 2020). Their review highlights a critical finding: anti-vaccine content often generates significantly more user engagement than factual pro-vaccine content, and even a brief exposure of just five to ten minutes to vaccine-critical websites can negatively impact a person's intention to vaccinate. This social vulnerability is aggressively exploited by automated actors. Shao et al. through a massive data analysis of 14 million tweets, found that social bots play a "disproportionate role" in amplifying low-credibility content (Shao et al., 2018). These bots are particularly effective because they target the early moments of a story's life, pushing it toward viral status, and strategically target influential human users to maximize its spread.

This combination of technological amplification and platform dynamics has a direct, quantifiable impact on human cognition and intent. A large-scale randomized controlled trial by Loomba et al. measured this impact precisely, finding that a single exposure to COVID-19 misinformation caused a significant 6.2 to 6.4 percentage point drop in "definite" vaccination intent in the UK and USA, respectively (Loomba et al., 2021). Crucially, their work revealed that misinformation designed to sound "scientific" was the most strongly associated with this decline in intent. Pennycook et al. investigated why people share this content, challenging the idea that users are simply confused or prefer partisanship over truth (Pennycook et al., 2021). Their experiments suggest the core problem is inattention; the social media context distracts users from applying their own accuracy standards, creating a large gap between what they would rate as accurate and what they actually share. This cognitive lapse is further complicated by the psychological factors identified by Scheufele and Krause, who note that misinformation persists because of motivated reasoning, the "backfire effect" (where corrections inadvertently increase a false claim's familiarity), and the "nasty effect," where uncivil online comments can make an underlying factual article appear biased and unreliable to readers (Scheufele & Krause, 2019).

Given the difficulty of correcting persistent misinformation, the literature explores a range of solutions, from proactive "pre-bunking" to reactive "debunking". One of the most promising proactive strategies is "inoculation theory," tested by van der Linden et al. Their randomized experiment on climate change misinformation demonstrated that it is possible to "pre-bunk" an audience by exposing them to a weakened version of a misleading argument beforehand (Van Der Linden et al., 2017). This inoculation successfully preserved the positive impact of a factual consensus message, even when it was directly attacked by misinformation.

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This is complemented by the "in-the-moment" intervention proposed by Pennycook et al. Because they identify inattention as the key vulnerability, they show that a simple, scalable "accuracy nudge"—a subtle prompt reminding users to consider accuracy—significantly increases the quality of news that people subsequently share (Pennycook et al., 2021). However, reactive debunking proves more complex. A meta-analysis by Chan et al. found that while detailed debunking messages are more effective at correcting misinformation, they are also surprisingly associated with stronger persistence of the original false claim. Their work also confirms that misinformation is highly persistent (d = 0.75–1.06) and that debunking is significantly less effective if the audience has already generated their own reasons supporting the misinformation (M. S. Chan et al., 2017), reinforcing the challenges identified by Scheufele and Krause regarding the persistence of false narratives (Scheufele & Krause, 2019).

Map of Development of Publications on the Topic of Disinformation Prevention

A bibliometric trend development map is an analytical instrument that visualizes specific developments and trends in scientific publications over time. This study's development map focuses on disinformation prevention within a specific period, namely 2014-2024. In bibliometric analysis, citations, titles, keywords, and other information are utilized to identify relevant research trends.

This study uses co-occurrence analysis to find research topics related to disinformation prevention. Mapping is done through three types of visualization: network visualization, overlay visualization, and density visualization. Network visualization illustrates the relationship between each keyword found on disinformation prevention, which is grouped into three color clusters based on their relatedness and connections. Adjacent keyword items are interpreted as a stronger relationship between them. In addition, there are also more significant circle points on certain keyword items, indicating that the topic has been studied more extensively or more than other topics with smaller sizes.

Network Visualization

This VOSviewer network visualization clearly maps the research landscape into two distinct but closely related thematic clusters, identified by the red and green colors. The red cluster on the left represents the "Public Health and Vaccine Behavior" domain. The central nodes in this cluster are dominated by covid, health, vaccination, and vaccine hesitancy. The size of these nodes, indicating their occurrence frequency, confirms that research is overwhelmingly focused on the health crisis sparked by the pandemic. Surrounding these are terms related to the subjects and barriers of intervention, such as patient, community, age, barrier, risk, and perception. This cluster effectively visualizes the real-world problem and impact being studied. On the opposite side, the green cluster on the right represents the "Media and Disinformation" domain. This cluster is centered on two high-frequency nodes, medium and fake news, highlighting the research focus on the vectors or channels of information dissemination. This cluster is populated by terms identifying specific platforms (facebook, twitter), broader concepts (internet, social media platform), the nature of the problem (false information), and proposed solutions (media literacy, fact checking).

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The most powerful insight from this map is not the separation of the two clusters, but the dense interconnectivity between them, indicating that these two themes are inseparable in the literature. The network visually affirms that modern disinformation research views the COVID-19 pandemic and the media "infodemic" as a single, intertwined crisis. The central nodes from both clusters, covid (red) and medium (green), serve as the primary bridges connecting the entire network, suggesting it is nearly impossible to discuss one topic without the other. More importantly, several conceptual nodes function as crucial "bridges" that explain the mechanism of this relationship. Terms like trust and perception, while technically in the red cluster, are spatially located in the center, midway between both worlds. This visually implies that a primary research focus is on how the platforms (medium, facebook) and content (fake news) from the green cluster directly influence public trust and perception. It is this erosion of trust that then flows into the core concepts of the red cluster, manifesting as vaccine hesitancy and becoming a barrier to health interventions within the community.

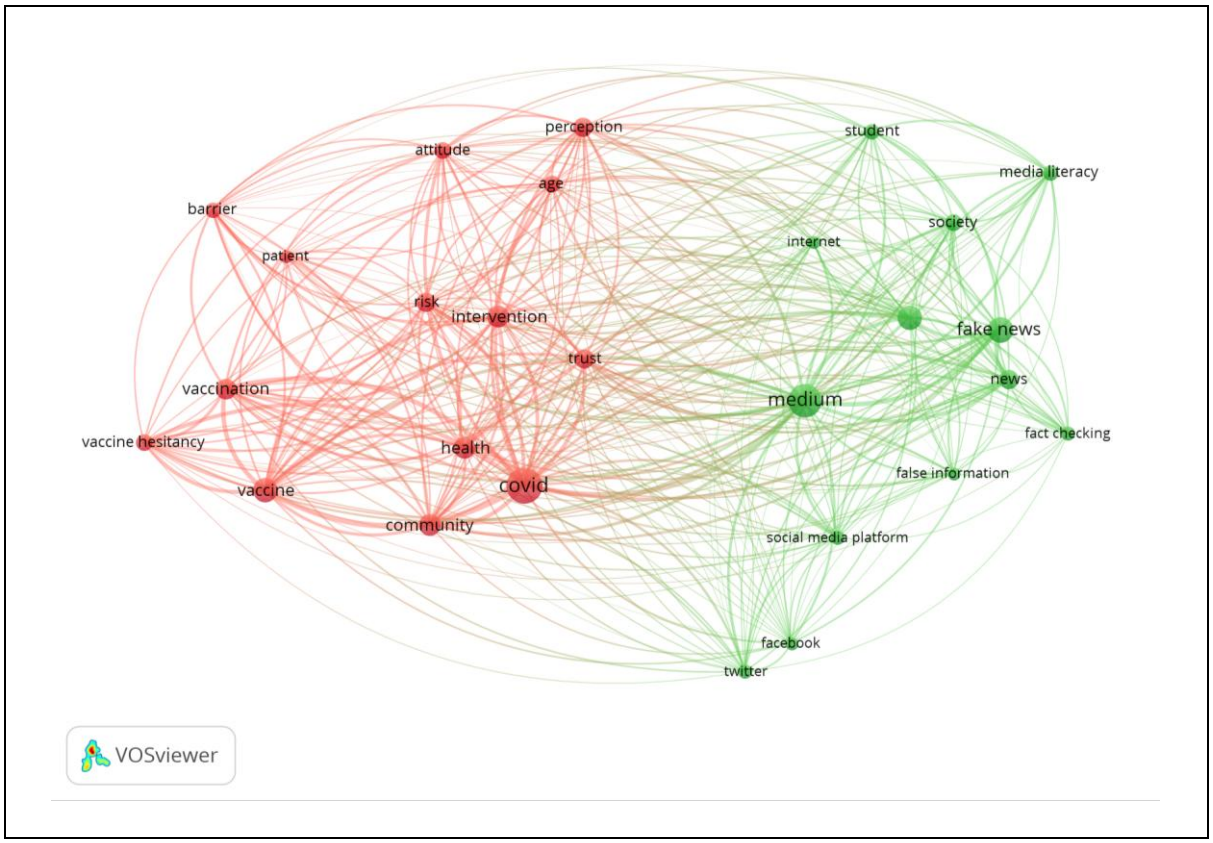

Figure 3. Network Visualization

Overlay Visualization

This overlay visualization (Figure 4) provides a crucial temporal dimension to the research network, illustrating the evolution of scientific inquiry from 2021.9 to 2022.3. The color gradient, moving from dark purple (older topics) to bright yellow (emerging topics), reveals a clear and logical research trajectory. The foundational, or "older," topics in this dataset are predominantly colored dark blue and purple. These include foundational concepts like medium, fake news, news, and specific platforms like twitter and facebook. This indicates that the field's origins lie in identifying the technological vectors and core channels of disinformation. As the

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timeline progresses, the research focus shifts to the large, green nodes, most notably covid, health, community, and trust. These "core" topics, appearing around 2022.1, represent the pandemic that galvanized the entire field, moving the focus from abstract media analysis to an urgent, real-world health problem. Finally, the bright yellow nodes highlight the most recent research frontier (c. 2022.3). This emerging work is tightly clustered around the specific consequences of the infodemic—vaccine hesitancy, vaccination, and vaccine—as well as the human factors that mediate it, such as perception, attitude, and age, and the key proposed solution, media literacy. (Kaya, 2020). In addition, there are also findings that state that the pandemic period has caused alertness in the community, plus much disinformation that causes people to be afraid of things related to the pandemic (Ferrara et al., 2020).

This temporal flow from platform analysis to behavioral intervention demonstrates the field's maturation, catalyzed by a global health crisis. The map illustrates that the established, older problem of fake news spreading via medium (purple) found a powerful new host in the covid pandemic (green). This event acted as a gravitational center, pulling the entire academic focus toward its immediate societal consequences. The network lines clearly show this progression: the infodemic (green/purple nodes) directly led to the newest, "hottest" topics of inquiry (yellow nodes), namely vaccine hesitancy. This visualization suggests that the scholarly community first identified the "what" (misinformation on platforms) and then, driven by the pandemic, moved to analyze the "so what" (its direct impact on health behaviors). Furthermore, the overlay shows an evolution in proposed solutions. The concept of fact checking (a darker green) appears as an earlier, established intervention. However, the emergence of media literacy as one of the newest, bright yellow nodes suggests a sophisticated shift in research. This may indicate a trend away from purely reactive strategies (debunking false claims after they spread) toward more proactive, cognitive strategies (inoculating and educating audiences before exposure) by focusing on the human factors of perception and attitude.

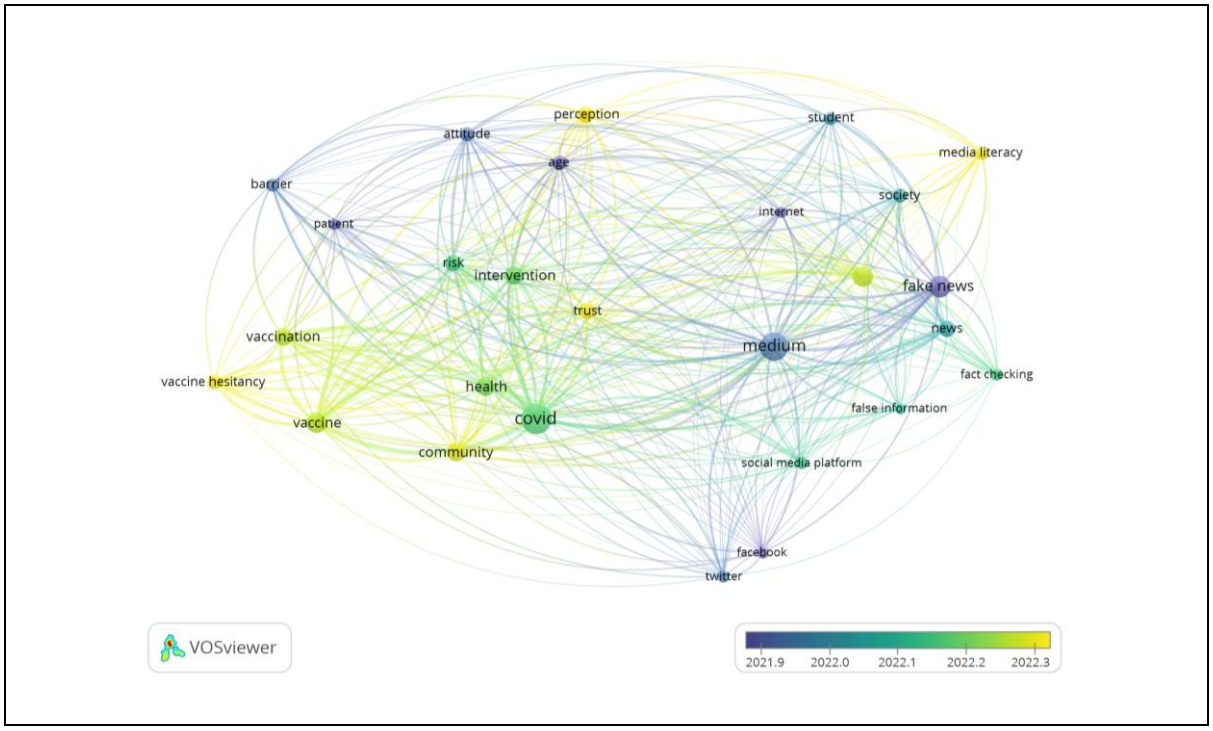

Figure 4. Overlay Visualization

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Density Visualization

This density visualization powerfully illustrates the intellectual core of the research field by revealing its "hotspots," or areas of highest concentration. The map is dominated by two primary hotspots, indicated by the brightest yellow areas, signifying the highest frequency and co-occurrence of terms. The first and most intense hotspot is centered around covid and health, with community and trust tightly integrated. This indicates that the vast majority of research in this domain is anchored in COVID-19 health crisis, examining its effects on community health and the critical role of public trust. The second major hotspot, nearly equal in intensity, is centered on medium and fake news. This highlights the other half of the research equation: the channels and the content responsible for the "infodemic." These two hotspots—one focused on a real-world health crisis and the other on the media crisis—function as the two gravitational centers of the entire research field.

Moving away from the bright yellow cores, the green and blue-green areas represent the secondary and tertiary themes that branch out from these central hubs. The covid/health hotspot extends its influence toward a significant sub-cluster on the far left, focused on vaccine, vaccination, and vaccine hesitancy. This clearly identifies vaccine-related behavior as the primary, most-studied consequence of the core health crisis. Other related terms in this cluster's orbit, such as patient, barrier, risk, attitude, and perception, function as the key variables researchers are using to understand why this hesitancy occurs. Similarly, the medium/fake news hotspot radiates out to its own set of satellite topics. These include specific platforms like facebook and twitter, broader concepts like social media platform and internet, and the key interventions being investigated, such as fact checking and media literacy. The visualization effectively shows that the field is structured around the covid and medium hubs, with research branching out to explore either the behavioral impacts (like vaccine hesitancy) or the technological/social solutions (like media literacy).

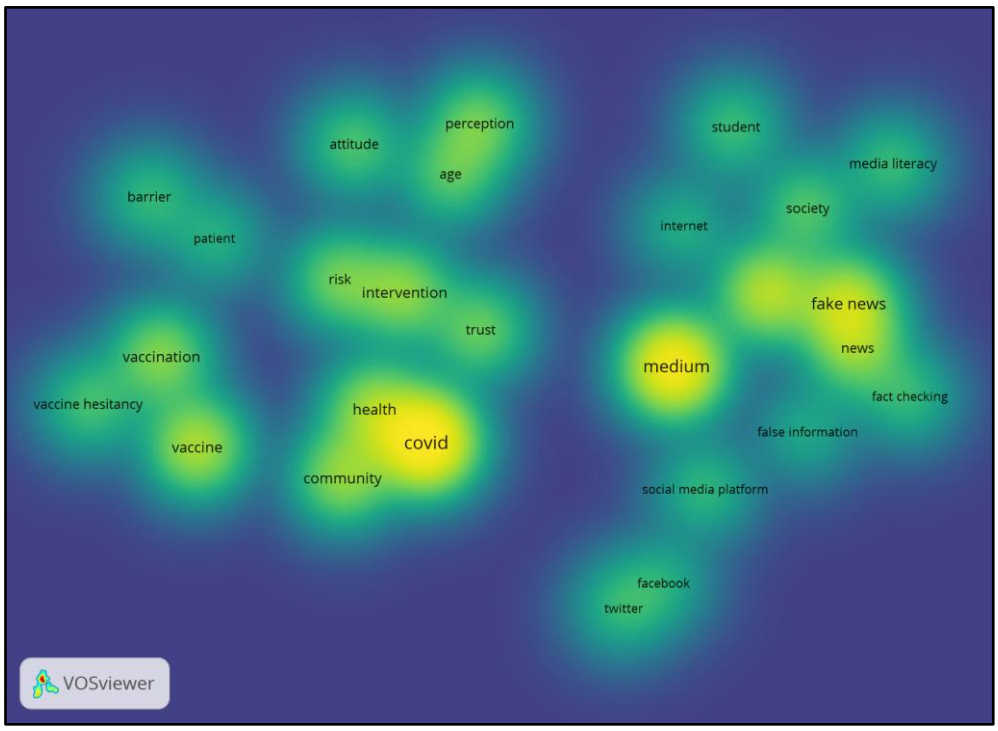

Figure 5. Density Visualization

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DISCUSSION

This study's findings, which illustrate exponential publication growth from 2020 onward and the establishment of "Medicine" and "Social Sciences" as the two dominant disciplines, provide striking, quantitative validation for the "infodemic" concept described in the literature. The bibliometric data confirms that the COVID-19 crisis was not merely a concurrent event but the field's primary organizing principle. This explains why the most-cited articles are precisely those that confronted the pandemic's tangible, real-world consequences, such as the severe mental and public health impacts identified by Rajkumar (2020), the societal barriers posed by conspiracy theories documented by Romer & Jamieson (2020), and the catastrophic outcomes reported by Islam et al. (2020). The identification of the "big three" disciplines provides a new structural framework, empirically demonstrating how researchers have integrated studies on technological vectors (Computer Science), such as the bot-driven amplification described by Shao et al. (2018) , with analyses of the societal and health outcomes (Medicine and Social Sciences). Furthermore, the novel finding of a 2023 dip followed by an all-time peak in 2024 suggests the field has now matured beyond a purely reactive phenomenon, likely to apply its crisis-born lessons to the sustained, non-pandemic contexts (e.g., political, environmental) noted in the introduction.

Beyond publication counts, the VOSviewer network maps visualize the intellectual structure of how these disciplines interact. The identification of trust and perception as the central "bridge" nodes linking the "Media and Disinformation" cluster (green) with the "Public Health" cluster (red) provides novel, visual confirmation for the mechanisms previously described in theoretical literature. For instance, where Puri et al. (2020) conceptually linked social media "echo chambers" to negative vaccination intentions, this study's network map empirically illustrates that pathway: the medium cluster is shown to act upon the trust node, which in turn connects directly to the vaccine hesitancy node. This finding suggests the erosion of trust is the key mechanism being studied, explaining why literature is so concerned with phenomena like the "nasty effect" (Scheufele & Krause, 2019) or "scientific sounding" misinformation (Loomba et al., 2021), as these are direct attacks on the perceptive faculties that mediate public trust.

The temporal overlay analysis powerfully illustrates the field's strategic evolution from problem identification to solution development. The finding that research progressed from older topics like medium and fake news to the crisis core of covid, and finally to emerging, "hot" topics like media literacy, tells a clear narrative. This scholarly shift appears to be a direct response to the documented limitations of reactive interventions. The map shows fact checking as an older, established (greener) node, a strategy that the literature has shown to be highly complex, potentially triggering a "backfire effect" (Scheufele & Krause, 2019) or even strengthening the persistence of the original misinformation (Chan et al., 2017). The emergence of media literacy as one of the newest, "hottest" (bright yellow) topics strongly suggests the field is pivoting toward the proactive, cognitive interventions—such as the "inoculation" advocated by van der Linden et al. (2017)) and the "accuracy nudges" proposed by Pennycook et al. (2021))identified as more scalable and effective.

The implications of these findings are both theoretical and practical. Theoretically, our analyses (validate a "dual hub" model of disinformation research, where the field is built on the inseparable pillars of the media crisis (medium, fake news) and the societal crisis (covid, health) . Practically, this structure, combined with the temporal shift toward solutions, demands

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a strategic reassessment of intervention efforts. The literature shows that reactive "debunking" is highly complex; Chan et al. (2017) found it can paradoxically strengthen the persistence of the original misinformation, and Scheufele & Krause (2019) note the "backfire effect" where corrections fail against motivated reasoning. Our findings show the research field itself is evolving in response to this. The emergence of media literacy as a "hot" new topic, coupled with the established success of proactive cognitive interventions like "inoculation" (van der Linden et al., 2017) and "accuracy nudges" (Pennycook et al., 2021), suggests that policymakers and platforms should prioritize these proactive, scalable strategies. Future research should leverage this study's findings, for example, by testing whether the intervention models developed in the covid/vaccine hesitancy hotspot can be effectively transported to the other "long tail" domains identified in Table 2, such as environmental (Ford et al., 2021) or financial disinformation.

This studies are subject to several important limitations inherent in its bibliometric design. First, the reliance on a single database, Scopus, means that relevant publications indexed exclusively in other databases, such as Web of Science, or non-indexed "grey literature" like institutional reports, were omitted. Second, the screening criteria introduced significant selection biases: the restriction to "English" language articles creates an Anglophone bias, excluding a potentially vast body of research from non-English-speaking regions on this global issue. More significantly, the filter for "All open access source type journal" is a major constraint, as the results do not reflect the contributions, impact, or thematic trends of research published in traditional, non-open access journals, which may include many foundational papers in the field. Finally, the VOSviewer analysis is based on keyword co-occurrence, which is effective for identifying thematic clusters and trends but cannot qualitatively assess the context, arguments, or conceptual nuances within the literature.

CONCLUSION

This bibliometric study reveals that disinformation prevention has crystallized into a robust and sustained field of interdisciplinary inquiry, fundamentally shaped by the crucible of a global health crisis. Its intellectual structure rests upon a tripartite foundation, integrating the problem domain of public health, the behavioral dynamics of social science, and the technological vectors of computer science. The field's trajectory has definitively moved beyond a narrow focus on content moderation, establishing that disinformation is not merely an informational challenge but a critical determinant of real-world health outcomes and societal stability. The research landscape is defined by the inseparable relationship between the mechanisms of information spread and their tangible impacts on human behavior, with the erosion of public trust serving as the central mechanism linking the two.

The temporal analysis of the field demonstrates a clear maturation from problem identification to sophisticated solution-building. The scholarly focus has logically progressed from documenting the channels of the "infodemic" to analyzing the acute societal consequences of its convergence with the pandemic. This crisis catalyzed the necessary evolution in intervention strategies, revealing a distinct trend away from purely reactive measures. The most recent and emerging scholarship suggests a sophisticated pivot toward proactive, cognitive-based solutions. This forward-looking orientation emphasizes the necessity of inoculating audiences and fostering systemic digital literacy, rather than relying solely on post-hoc corrections. This study, therefore, validates the field's new direction and

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provides a structural framework that can guide future research and policy, prioritizing proactive strategies that build long-term societal resilience against misinformation.

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Author Contributions: Angga Hadiapurwa wrote the manuscript. The author has read and agreed to the published version of the manuscript.

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