

Article

# Research on Disinformation in Academic Studies: Perspectives through a Bibliometric Analysis

Nuria Navarro-Sierra, Silvia Magro-Vela  and Raquel Vinader-Segura \*

Departamento de Comunicación Audiovisual y Publicidad, Facultad de Comunicación, Universidad Rey Juan Carlos, 28942 Fuenlabrada, Spain; nuria.navarro.sierra@urjc.es (N.N.-S.); silvia.magro@urjc.es (S.M.-V.)

\* Correspondence: raquel.vinader@urjc.es

**Abstract:** Disinformation is a phenomenon of concern to all political systems, as it poses a threat to freedom and democracy through the manipulation of public opinion aimed at eroding institutions. This paper presents a bibliometric and systematized study which allows the establishment of a comprehensive view of the research and current state of academic investigations on disinformation. To this end, a content analysis of the scientific articles indexed in Scopus up to 31 December 2023 has been carried out based on three categories of analysis: journals, authors and investigations. Similarly, a systematic study of the 50 most cited articles in this sample was performed in order to gain a deeper understanding of the nature, motivations and methodological approaches of these investigations. The results indicate that disinformation is a research topic which has gained great interest in the academic community since 2018, with special mention to the impact of COVID-19 and the vaccines against this disease. Thus, it can be concluded that disinformation is an object of study which attracts significant attention and which must be approached from transdisciplinarity to respond to a phenomenon of great complexity.

**Keywords:** information disorders; malinformation; misinformation; disinformation; fake news; Scopus; bibliometric; systematic



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## 1. Introduction

In the last decade, disinformation has emerged as a phenomenon of remarkable complexity, standing out especially for its constitutive plurivocity. Not only does it manifest itself as an (un)informative phenomenon with diverse strategies, but it is also presented in multiple forms in the numerous academic approaches which have been published in the last decade [1–3]. This conceptual variety reflects the epistemological difficulty in its definition, encompassing a wide range of terms such as disinformation, misinformation, fake news, hoax, deepfakes and astroturfing, amongst others [4–6], all of which refer to different realities within the same phenomenon that is normally termed generically, in turn, as disinformation. In addition, academic research has highlighted the various scenarios in which disinformation proliferates, especially stressing its predominant presence on social media [7,8].

A rallying point of the academic literature is the threatening nature of contemporary political systems of disinformation, in that they jeopardize the ability of individuals to freely generate their own opinions, an essential feature of democracies [9]. This factor may be a determining one when justifying the overwhelming number of initiatives of different natures which have been put forward to identify and mitigate its effects. These include not only governmental actions and international organizations to combat disinformation [10–12], but also other academic proposals which have made effective progress in identifying the phenomenon. Among them, Salaverría and Cardoso [2] propose a study on the future of disinformation research that emphasizes the four most studied aspects: typological studies of disinformation; fact-checking; disinformation on digital

platforms; and media literacy. In addition, their proposal goes a step further and points out, within these emerging fields, what studies are addressing the topic and what they should pay attention to in the future.

Among these topics, research has highlighted the role of spreading false information, identifying its sources and subjects. It also focuses on recognizing the characteristic elements that allow its identification, as well as searching for population segments most vulnerable to its impact. Understanding the causes and motivations behind disinformation has been another key area of interest [13–15]. These approaches, which emanate from various academic disciplines, seek to illuminate the intricate dynamics of disinformation, thus promoting the development of more effective strategies to mitigate the adverse effects that this phenomenology generates in the social fabric [16,17].

This richness in the disciplines which have addressed the phenomenon and its protean nature itself underpin the interest of this research since, in this context, conducting a bibliometric study is presented as an essential tool to understand the evolution and dimension of disinformation [18]. It also offers a historical and social context that explains why it has emerged and intensified in recent times, especially in relation to technological development and changes in media consumption, as well as its multidisciplinary nature through knowledge of the areas which address this phenomenon. On the other hand, a systematic study of the most cited articles within the field of disinformation will allow us to not only understand the magnitude of the problem, but also to design appropriate strategies and policies to counter disinformation more effectively [19].

Although bibliometric studies on disinformation are not new to the academic literature, and other authors have published articles with data close to that presented here [20,21], this work presents significant contributions that expand the current understanding of the topic. The integration of a bibliometric analysis along with a detailed systematic analysis, focused especially on the 50 most cited articles, allows us to offer a richer and deeper perspective on the methodological approaches of disinformation research. This dual approach, which combines quantification with analytical depth, is notable for its ability to identify emerging trends and research priorities.

Furthermore, the study of the 50 most cited articles demonstrates the importance of transdisciplinarity in the study of disinformation, addressing it not only from multiple disciplines but also by promoting the active integration of knowledge to better understand this complex phenomenon. Through the analysis of a sample updated to December 2023, we provide insights into how disinformation is being addressed in fields as varied as Social Sciences, Medicine, and Computer Science, highlighting the need for collaborative and multifaceted strategies to effectively counteract its effects. The relevance of our research is further underscored by the global diversity of contributions, with an analysis that encompasses 8070 documents and reflects the breadth and depth with which the international academic community is responding to the challenges posed by disinformation.

Therefore, despite methodological similarities with previous research, we believe this study brings new insights into disinformation studies. By updating the existing body of knowledge with recent data and delving into the analysis of the most influential articles, our work not only reflects the current state of research but also points towards future directions, highlighting emerging areas and providing a solid foundation for the development of more informed and effective interventions against disinformation.

## 2. Materials and Methods

The present research aims to understand the state of scientific research on disinformation through a bibliometric study and a systematic analysis. Bibliometrics is a branch of scientometrics oriented towards the quantitative study of scientific publications [22]. Its descriptive approach focuses on the quantification of scientific and academic output, allowing for the identification of publication patterns, collaboration, and knowledge dissemination. Unlike other investigative methods that seek to establish causal relationships, bibliometrics confines itself to describing and measuring specific aspects of scientific information, such

as citation frequency or the distribution of publications in a specific field. Bibliometric studies are a vision of research activity in a national and/or international context [23] and serve to qualify the scientific process, providing important information on scientific production and allowing the opening of new lines of research based on reflection on what has already been published [24]. On the other hand, a systematic analysis facilitates a more detailed exploration of a portion of the bibliometric study sample. This approach focuses on discovering relevant elements and characteristics, as well as identifying relationships and common aspects among the articles examined through the categories and research questions posed [25,26].

In this way, the present work aims to show an accurate picture of the state of scientific research on the global phenomenon of disinformation. In order to achieve this objective, a series of partial goals were set: (1) to determine the area of knowledge in which there are the greatest number of publications on this subject; (2) to verify research of scientific activity in the different disciplines; (3) to study the origin of the publications; and (4) to carry out a systematic analysis of the 50 most cited articles on disinformation.

This is, therefore, a descriptive type of research that will be performed with a quantitative approach through this academic discipline. To achieve this objective, a content analysis has been performed using the scientific article as an element of analysis, since it is the basic unit of scientific communication. Through this type of publication, researchers from all over the world have access to the reading and use of published scientific data.

Multistage sampling was carried out to obtain these items for analysis through the Scopus database, one of the most prestigious in the international context. Thus, we selected those which met a series of requirements: (1) scientific articles published in open access; (2) those containing in the title, keywords and/or abstract any of the following words: Disinformation, Dis-information, Malinformation, Mal-information, Misinformation, Misinformation, Fakenews, Fake news or Fake-news; (3) published since records were kept up to 31 December 2023; and (4) language of publication—those written in English, Spanish or Portuguese were selected as they are the most prolific in publications on disinformation. According to Scopus data, the third language, which is Portuguese, accounts for 159 articles, while the fourth is French with 10 publications; the difference between these makes it pertinent to present the data from the first three languages. Fulfilling all these criteria, a final sample of 8070 documents was obtained.

Once the sample was established, three levels of analysis were decided [27], and from there the following indicators were established:

- Journals, referring to publications: journal name, year of publication, language of publication, publisher, area of knowledge.
- Authors, which analyzes authorship: number of authors per publication, institutional affiliation and country of origin.
- Research (Systematic Study—50 most cited articles) on the content of the texts: subject matter, transdisciplinary, motivation, keywords, methodology and analysis techniques used.

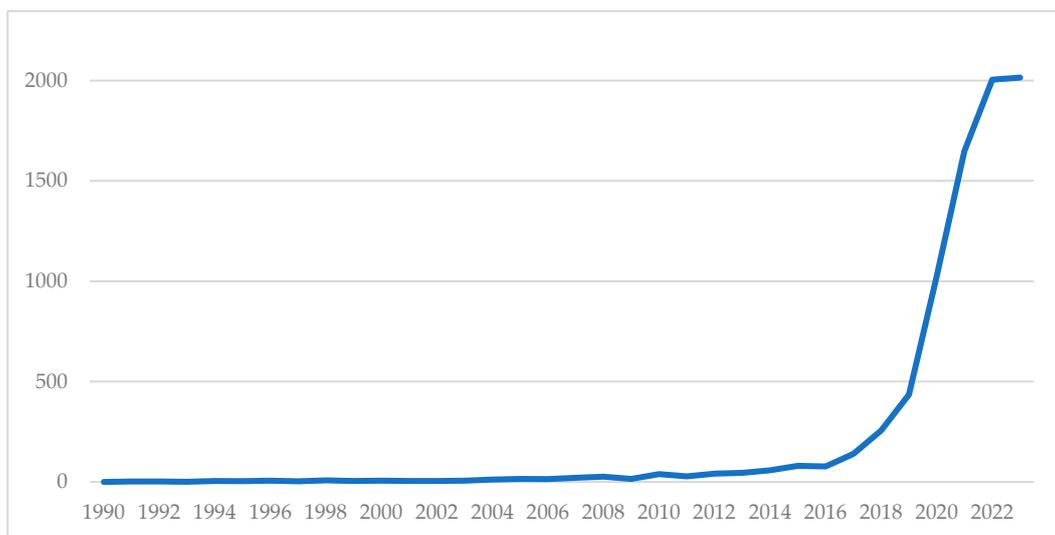
### 3. Results

Taking into account the aforementioned criteria, 8070 scientific articles were registered from the Scopus database. The main results obtained after statistical analysis of the registered data, bearing in mind the three levels of analysis established in the research design, are presented below.

#### 3.1. Journals

Publications on disinformation in the Scopus database date back to 1964, when the first scientific article meeting the aforementioned requirements was recorded. This is evidence that this phenomenon is not recent, but its importance has been increasing over time, as the data show. Thus, if we look at the data as a whole, it becomes apparent that the intensity of publication on this issue is not uniform (Figure 1). In fact, the data show an upward

trend since 2018, which is consolidated in the period 2020–2023, in which almost 80% of the documents are concentrated.



**Figure 1.** Evolution of publications related to disinformation (1990–2023 period). Source: own elaboration based on data from Scopus.

This fact could be explained by the interest of the academic community in studying the impact of disinformation regarding the Coronavirus and subsequent vaccination against this disease. However, after studying the areas of knowledge, a wide variety of disciplines approaching this subject of study can be observed, with Social Sciences, Medicine and Computer Sciences being the ones which bring together the most publications. These account for 55% of the academic papers. However, the contributions of Psychology (6%), Arts and Humanities (6%), Engineering (5%) and Environmental Sciences (3%) should also be highlighted. Scopus records articles on the subject in a total of 27 disciplines. This demonstrates that disinformation is a cross-cutting problem which affects all areas of knowledge.

In this sense, there is a wide variety of journals that have published the analyzed papers, but the performance of each of them is varied. Thus, there are journals that have published only a few papers compared to others which have published dozens or even hundreds of articles on this topic. *PLOS One* stands out as the journal which has published the most with 203 articles, 3% of the sample of this study, followed by the *International Journal of Environmental Research and Public Health* ( $n = 161$ ), *Journal of Medical Internet Research* ( $n = 135$ ) and *IEEE Access* ( $n = 107$ ). As can be seen in Table 1, the 25 journals which have published the most scientific articles account for 22% of the total ( $n = 1810$ ).

The journals are diverse in terms of their origin and the areas of knowledge of their publications. Thus, we have recorded journals that come from an international context, but Switzerland ( $n = 6$ ) and the United States ( $n = 6$ ) are the territories of origin of a significant number of titles. This international vocation and the intention to achieve the widest dissemination of published results is evident in the use of English as the main language of publication. This trend was extrapolated to the total sample, showing that 93.5% of the papers are published in English ( $n = 7619$ ), while Spanish ( $n = 373$ ) and Portuguese ( $n = 159$ ) can be considered minority languages. In the case of Spanish, the publication of these works in said language is mainly due to the work of two journals, *El Profesional de la Información* and *Estudios del Mensaje Periodístico*, ranked 7th and 21st, respectively, in the ranking of journals with the highest number of publications.

**Table 1.** Journals with the most publications on disinformation.

#	Name	Docs	Country	Publisher	Language	Subject Area
1	<i>PLOS One</i>	203	United States	PLOS	English	Multidisciplinary
2	<i>International Journal of Environmental Research and Public Health</i>	161	Switzerland	MDPI	English	Medicine, Environmental Science
3	<i>Journal of Medical Internet Research</i>	135	Canada	JMIR Publications Inc.	English	Medicine
4	<i>IEEE Access</i>	107	United States	IEEE	English	Engineering, Computing Science, Materials Science
5	<i>Vaccines</i>	92	Switzerland	MDPI	English	Medicine, Pharmacology, Immunology
6	<i>Social Media and Society</i>	86	United Kingdom	SAGE	English	Social Sciences: Cultural Studies, Communication, Computing Science
7	<i>Profesional de la Información</i>	85	Spain	El profesional de la información	English, Spanish	Social Sciences, Communication, Library and Information Sciences
8	<i>Harvard Kennedy School Misinformation Review</i>	80	United States	Harvard Kennedy School	English	Social Sciences
9	<i>Scientific Reports</i>	78	Germany	Springer Nature	English	Multidisciplinary
10	<i>Frontiers in Public Health</i>	71	Switzerland	Frontiers Media	English	Medicine: Public Health, Environment and Occupational Health
11	<i>Media and Communication</i>	70	Portugal	Cogitatio Press	English	Social Sciences: Communication
12	<i>Frontiers in Psychology</i>	64	Switzerland	Frontiers Media	English	Psychology
13	<i>BMC Public Health</i>	62	Germany	Springer Nature	English	Medicine: Public Health, Environment and Occupational Health
14	<i>Proceedings of the ACM on Human–Computer Interaction</i>	54	United States	Association for Computing Machinery	English	Social Sciences, Computing Science
15	<i>Human Vaccines and Immunotherapeutics</i>	50	United Kingdom	Taylor & Francis	English	Pharmacology, Medicine, Immunology
16	<i>Proceedings of The National Academy of Sciences of The United States of America</i>	46	United States	National Academy of Sciences	English	Multidisciplinary

Table 1. Cont.

#	Name	Docs	Country	Publisher	Language	Subject Area
17	<i>BMJ Open</i>	45	United Kingdom	BMJ Publishing Group	English	Medicine
18	<i>Jmir Formative Research</i>	44	Canada	JMIR Publications Inc.	English	Medicine
19	<i>Vaccine</i>	44	Netherlands	Elsevier	English	Veterinary, Medicine, Immunology
20	<i>Jmir Infodemiology</i>	41	Canada	JMIR Publications Inc.	English	Medicine, Computing Science
21	<i>Estudios Sobre El Mensaje Periodístico</i>	40	Spain	Universidad Complutense de Madrid	English, Spanish	Social Sciences: Cultural Studies, Communication
22	<i>Applied Cognitive Psychology</i>	39	United States	Wiley-Blackwell	English	Arts and Humanities, Psychology
23	<i>Applied Sciences Switzerland</i>	38	Switzerland	MDPI	English	Engineering, Physics and Astronomy Materials Science, Chemical Engineering
24	<i>Frontiers In Communication</i>	38	Switzerland	Frontiers Media	English	Social Sciences, Communication
25	<i>New Media and Society</i>	37	United Kingdom	SAGE	English	Social Sciences: Sociology, Communication

Source: own elaboration based on data from Scopus.

Another interesting topic regarding the journals, taking into account the top 25 publications, is their publishing company. Thus, within this ranking, it can be seen that 13 titles belong to a publishing group. Thus, Frontiers Media, MDPI and JMIR Publications Inc., with 3 journals each, and SAGE and Springer Nature, with 2, are the most outstanding publishing companies in terms of the number of publications they contribute to the scientific community, and they do so with significant contributions in different areas of knowledge.

### 3.2. Authors

The authorship of the papers is widely distributed, probably due to the variety of papers of international origin and relating to different areas of knowledge. Thus, the top 25 authors on research topics related to disinformation (Table 2) account for only 6% of the registered articles, with 474 documents.

The profile of these authors with the most publications is characterized by being mainly male (76%), belonging to institutions in Anglo-Saxon countries (88%), and coming from the field of Psychology (48%). In terms of their academic performance, we can highlight 19 publications on average. These are, therefore, authors with a prominent role in terms of their work related to disinformation. However, the role of authors such as Ecker or Lewandosky, each of whom have more than 40 publications, is worth noting, although some of them have been published jointly.

**Table 2.** Authors with the most scientific articles published on disinformation.

#	Author	Affiliation	Country	Subject Area	Gender	Disinf. Docs	Total Docs	%
1	Ecker, U.K.H.	The University of Western Australia	Australia	Psychology	Male	44	111	40%
2	Lewandowsky, S.	University of Bristol	United Kingdom	Psychology	Male	41	281	15%
3	Hameleers, M.	University of Amsterdam	Netherlands	Communication	Male	32	87	37%
4	Loftus, E.F.	University of California	United States	Psychology	Female	31	356	9%
5	Rand, D.G.	Massachusetts Institute of Technology (MIT)	United States	Psychology	Male	31	225	14%
6	Pennycook, G.	Cornell University	United States	Psychology	Male	29	118	25%
7	van der Linden, S.	University of Cambridge	United Kingdom	Psychology	Male	23	171	13%
8	Roozenbeek, J.	University of Cambridge	United Kingdom	Psychology	Male	21	40	53%
9	Otgaar, H.	Maastricht University	Netherlands	Psychology	Male	20	223	9%
10	Menczer, F.	Indiana University	United States	Computing Science	Male	17	187	9%
11	Nyhan, B.	Dartmouth College	United States	Political Science	Male	17	79	22%
12	Carley, K.M.	Carnegie Mellon University	United States	Computing Science	Female	15	458	3%
13	Ferrara, E.	University of Southern California	United States	Computing Science	Male	13	187	7%
14	Quattrociocchi, W.	Sapienza Università di Roma	Italy	Computing Science	Male	13	78	17%
15	Swire-Thompson, B.	Northeastern University	United States	Political Science and Psychology	Female	13	27	48%
16	Altay, S.	University of Oxford	United States	Political Science	Male	13	28	46%
17	Reifler, J.	University of Exeter	United Kingdom	Political Science	Male	12	86	14%
18	Jamieson, K.H.	University of Pennsylvania	United States	Communication	Female	12	183	7%
19	Murphy, G.	University College Cork	Ireland	Psychology	Female	12	47	26%
20	Cook, J.	University of Melbourne	Australia	Psychology	Male	11	55	20%
21	Chadwick, A.	Loughborough University	United Kingdom	Communication	Male	11	43	26%
22	Vaccari, C.	The University of Edinburgh	United Kingdom	Political Science	Male	11	65	17%
23	Chan, J.C.K.	Iowa State University	United States	Psychology	Male	11	35	31%
24	Greene, C.M.	University College Dublin	Ireland	Psychology	Female	11	58	19%
25	Bastos, M.	University College Dublin	Ireland	Communication	Male	10	44	23%
						474	3272	

Source: Own elaboration.

The data shown in Table 2 allow the analysis of the role of these authors considering the total number of their publications in Scopus. Thus, the authors with the highest number of documents related to the topic of disinformation are not necessarily those who have published the most articles and/or are indexed in this database, and therefore those who demonstrate a greater emphasis on this issue in their research career. Noteworthy are

researchers such as Roozenbeek, Swire-Thompson, and Altay, with more than 40% of their articles registered in this database being related to this research topic. Meanwhile, Ecker (44 docs) and Hameleers (32 docs) have a significant number of articles in the selected sample, representing 40% and 37%, respectively, of their total publications in Scopus.

If we analyze the contribution to the field of study by the universities of affiliation of the author (Table 3), the first 25 universities contributed 20% of the study sample ( $n = 1590$ ). These institutions are mainly from the United States ( $n = 673$ ), United Kingdom ( $n = 359$ ) and Australia ( $n = 139$ ). In terms of origin, countries such as Spain, the Netherlands, Canada, Brazil, Switzerland and Singapore also stand out in terms of the number of papers published by their authors. This provides a global context of the institutions with the most contributions.

**Table 3.** Universities with the most publications on disinformation.

#	University	Country	Number of Articles
1	University of Oxford	United Kingdom	100
2	Universiteit van Amsterdam	Netherlands	89
3	The University of Western Australia	Australia	73
4	University of Pennsylvania	United States	69
5	Harvard University	United States	68
6	University of Toronto	Canada	68
7	University of Michigan, Ann Arbor	United States	68
8	London School of Hygiene & Tropical Medicine	United Kingdom	68
9	University of Washington	United States	67
10	University College London	United Kingdom	67
11	Massachusetts Institute of Technology	United States	67
12	The University of Sydney	Australia	66
13	University of Cambridge	United Kingdom	66
14	Harvard Medical School	United States	65
15	Stanford University	United States	65
16	Universidade de São Paulo	Brazil	62
17	Universidad Complutense de Madrid	Spain	59
18	University of Bristol	United Kingdom	58
19	The University of North Carolina at Chapel Hill	United States	58
20	University of California, Irvine	United States	52
21	Universität Zürich	Switzerland	47
22	National University of Singapore	Singapore	47
23	Universidad Rey Juan Carlos	Spain	47
24	Indiana University Bloomington	United States	47
25	University of California, San Francisco	United States	47

Source: own elaboration based on data from Scopus.

### 3.3. Research (Systematic Study—50 Most Cited Articles)

In order to delve deeper into the characteristics of research on disinformation, the 50 publications with the most citations in Scopus within the period and parameters described in the Materials and Methods Section of this research were filtered.

As with the total number of articles covered in this study, the most cited articles were also analyzed in terms of the journal in which they were published, the editor, the country and the area or areas to which they belong. An analysis of the authors of these articles was also carried out, taking into account their country and field of expertise, as well as the methods and techniques applied in these studies.

Moreover, an analysis of the SCIVAL indicators was conducted for these 50 most cited articles, focusing on the topics in which Scopus has indexed these works, the prominence percentage and the FWCI. Thus, 22 distinct categories were detected, with the “Rumor; Social Media: Disinformation” topic ( $n = 16$ ) significantly standing out with a prominence of 99.819%, aligning with the main thematic focus of these articles and the overall sample. Therefore, it represents significant visibility at present. Similarly, other recurring topics include “Vaccine Hesitancy; Measles; Anti-Vaccination Movement” ( $n = 5$  and prominence 99.970%); “Conspiracy Theory; Mentality; COVID-19” ( $n = 4$  and 99.244%); and “Twitter; Human Influenza; Social Media” ( $n = 4$  and prominence 99.688%). Moreover, considering the prominence variable, research with higher values and thus greater visibility are those related to “Psychological Support; Mindfulness; COVID-19” (99.996%), “Radiological Findings; Clinical Features; COVID-19” (99.994%), or “Vaccine Hesitancy; Measles; Anti-Vaccination Movement” (99.970%). Regarding the Field-Weighted Citation Indicator (FWCI), Table 4 further displays the 25 articles with the highest citation impact in their respective fields.

**Table 4.** Top 10 articles with the highest FWCI.

ID	Title	SCIVAL Topics	Prominence %	FWCI
1	COVID-19 and mental health: A review of the existing literature	Psychological Support; Mindfulness; COVID-19	99.996	172.95
2	Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA	Vaccine Hesitancy; Measles; Anti-Vaccination Movement	99.970	111.78
3	Conspiracy theories as barriers to controlling the spread of COVID-19 in the U.S.	Conspiracy Theory; Mentality; COVID-19	99.244	88.44
4	Fighting COVID-19 Misinformation on Social Media: Experimental Evidence for a Scalable Accuracy-Nudge Intervention	Rumor; Social Media: Disinformation	99.819	70.73
5	Vaccine hesitancy: the next challenge in the fight against COVID-19	Vaccine Hesitancy; Measles; Anti-Vaccination Movement	99.970	66.60
6	A Comprehensive Review of the COVID-19 Pandemic and the Role of IoT, Drones, AI, Blockchain, and 5G in Managing its Impact	Bitcoin; Ethereum; Internet of Things	99.989	64.83
7	The science of fake news: Addressing fake news requires a multidisciplinary effort	NO DATA	NO DATA	61.70
8	High rates of COVID-19 vaccine hesitancy and its association with conspiracy beliefs: A study in Jordan and Kuwait among other Arab countries	Vaccine Hesitancy; Measles; Anti-Vaccination Movement	99.970	49.40
9	Health-protective behaviour, social media usage and conspiracy belief during the COVID-19 public health emergency	Conspiracy Theory; Mentality; COVID-19	99.244	46.18
10	A Survey of Fake News: Fundamental Theories, Detection Methods, and Opportunities	Rumor; Social Media: Disinformation	99.819	45.41

Source: own elaboration based on data from Scopus.

### 3.3.1. Journals

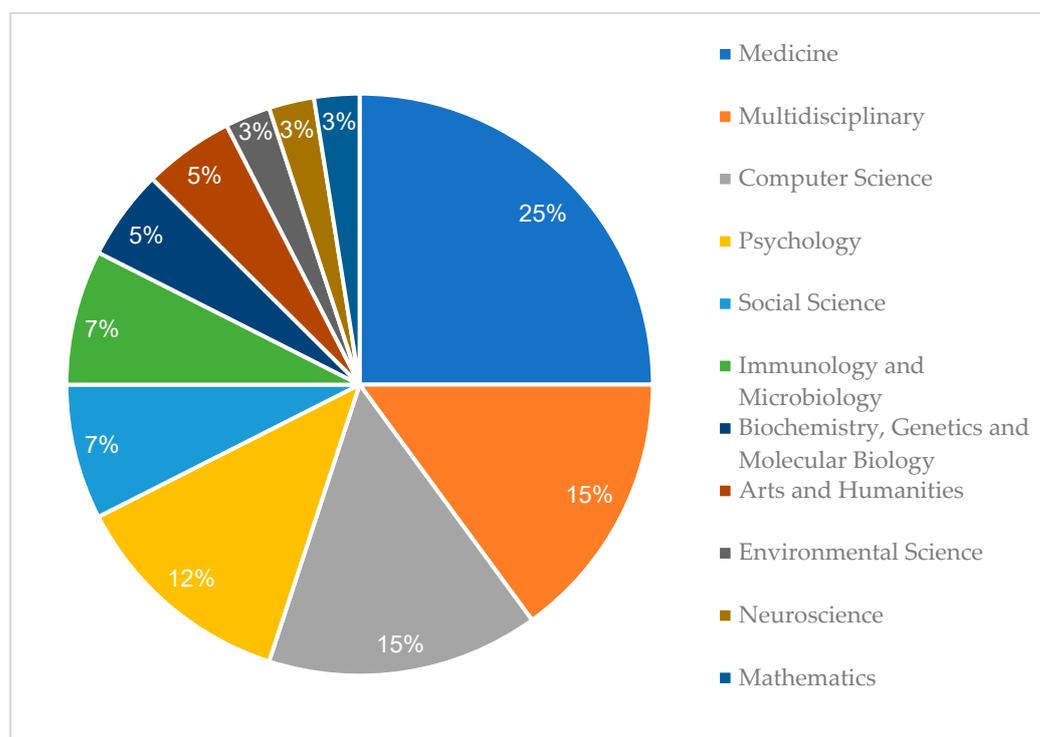
In view of the data obtained, there is no clear trend showing the specialization of any publications on disinformation, but only a few stand out from the rest by having more than

one article. These are *PLoS One* ( $n = 3$ ); *Proceedings of the National Academy of Sciences of the United States of America* ( $n = 3$ ); *Psychological Science* ( $n = 2$ ); *BMJ Global Health* ( $n = 2$ ); *Journal of Medical Internet Research* ( $n = 2$ ); and *JMIR Public Health and Surveillance* ( $n = 2$ ).

With regard to the geographical location from which the articles with the greatest impact are published, and in accordance with the results, the United States is at the top of the list with 16 headers, although the difference with the United Kingdom is minimal ( $n = 15$ ). Behind are the Netherlands, Switzerland and Canada, all of them equal to or below 3 publications.

Finally, it is interesting to know the area of publication of the articles studied in order to understand in which areas this topic has a special incidence or is of greater interest.

As shown in Figure 2, the field of Medicine predominates (25%), followed by journals belonging to the Multidisciplinary area (15%), Computer Science (15%) and Psychology (12%).



**Figure 2.** Journal subject area. Source: own elaboration based on data from Scopus.

However, despite these data, in order to gain a deeper understanding of the perspectives from which disinformation is approached, the articles were analyzed taking into account their subject matter and also their final motivation. After their classification, three categories were established that responded to the general theme: health ( $n = 26$ ), psychology ( $n = 5$ ) and another more generic branch called “disinformation as a threat to the communicative process”, which affects different areas transversally—social networks, politics, technology and climate change, among others—( $n = 19$ ).

Following this criterion, the articles were coded into subcategories in order to better understand what they address. Among the studies carried out on health, the treatment of disinformation in relation to COVID-19 stands out, accounting for 84.62% of them ( $n = 22$ ). The rest only showed residual percentages as follows: disinformation and H1N1 flu (3.85%); disinformation and HIV (3.85%); disinformation and Ebola (3.85%); and, finally, an article which not only studied the relationship between public perception of COVID-19 threats, but was based on how information and/or disinformation is presented by politicians and the media (3.85%).

The next major theme is disinformation as a threat to communication; that is, disinformation itself.

In this case, there is also a division according to more specific issues. The texts which stood out focused on exploring the relationship between disinformation or misinformation processes within social media (31.58%). This was followed by a similar representation (21.05%) of research that focuses on the study of disinformation from a technological perspective—which includes a review of methods for detecting fake news, techniques for manipulating expressions and faces, and other logarithmic or programmatic issues—and those that investigate electoral processes and the disinformation mechanisms which influence them. In third position (15.79%) are those articles that explore fake news from a more general point of view; for example, their characteristics or how they are disseminated, etc. The last position (10.53%) is held by the two studies that address disinformation applied to climate change and its consequences.

Finally, the third large group, which deals with psychology, has not been broken down because it presents more heterogeneous research that seeks to relate the malicious or erroneous use of information with aspects of personality, which influences the bias or reliability of the source, among other things.

It is customary to measure the impact of research in terms of the number of citations received. All the articles within the range of the 50 most cited exceed 300 citations (Table 5). From the eighth position onwards, the number of citations rises above 1000, and in the first two positions the number of citations exceeds 2000. The total number of citations reached by the 50 articles is  $n = 32,661$ , but the distribution of these figures in relation to the subject is heterogeneous. Thus, the perspective that has aroused the most interest given the volume of citations received has to do with COVID-19 and all the informative confusion experienced during the pandemic. This topic holds first position with a great distance from the rest, as can be seen in the following table. The background color highlights the areas with more citations per article.

**Table 5.** Quotes received according to subject topic.

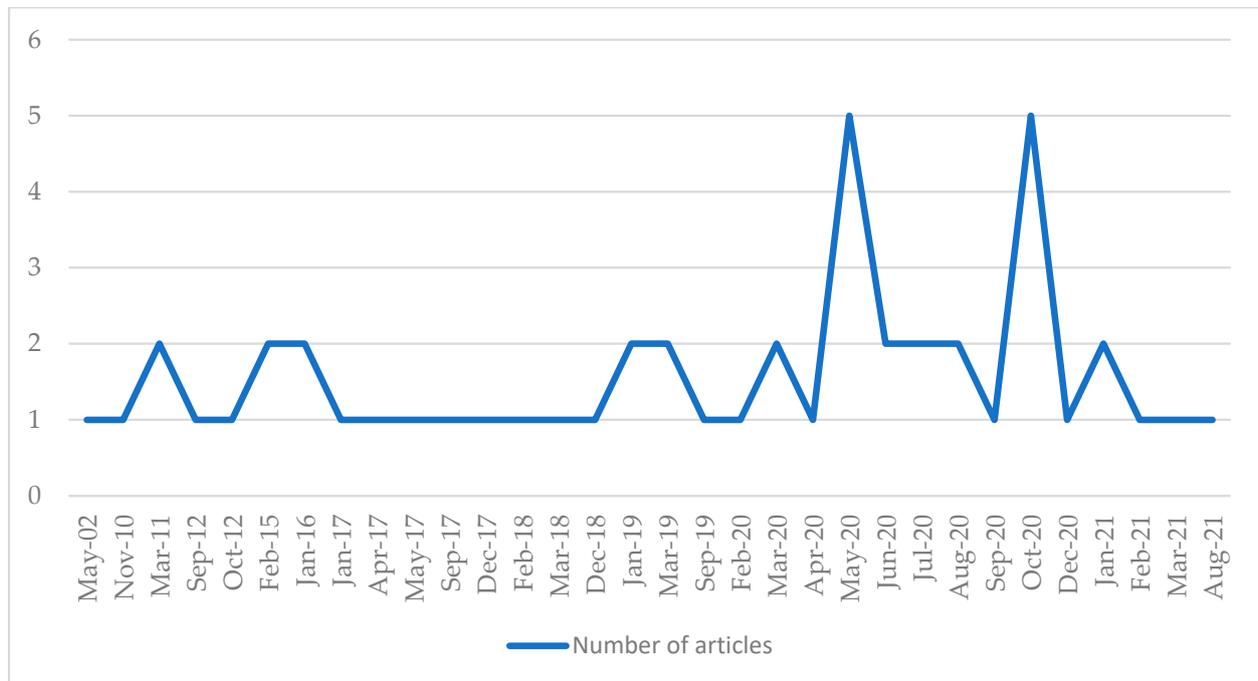
Topic	N° Articles	Number of Quotes	Average
Health and COVID	22	13,926	633
Fake News	3	4311	1437
Disinformation and Social Networks	6	4280	713.33
Psychology	5	2958	591.6
Disinformation and Politics	4	1979	494.75
Disinformation and Technology	4	1838	459.5
Health and H1N1 flu	1	1162	1162
Disinformation and Climate Change	2	893	446.5
Health and HIV	1	658	658
Health and Ebola	1	331	331
Health, COVID and Politics	1	325	325

Source: own elaboration.

Another consideration to bear in mind is that most of the research has not been published as thematic issues, but as miscellanea, thus presenting a great diversity of objects and fields of study. On the contrary, only five studies correspond to monographs, where the medical discipline and, specifically, the context of COVID-19 is the main focus.

Also significant are the periods in which the most cited articles are located in time, i.e., their date of publication. On those occasions in which the articles have been made available to readers online prior to the publication of the issue in which they are included, the former was taken into account.

Figure 3 shows the data corresponding to this temporal distribution, where the first thing which can be noticed is an upward trend in volume, which indicates a high degree of citability and, therefore, of interest in the topic of disinformation.



**Figure 3.** Time distribution of the most cited papers. Source: own elaboration based on data from Scopus.

Another of the issues which becomes relevant when viewing the data provided by Figure 3 is that 2020 is the year with the most publications. Therefore, 22 articles fall within this period, which represents 44% of the total—always in relation to the 50 most cited in Scopus. It seems inevitable to connect these results with the concern that arose at an international level during the pandemic, especially during the moments of greatest confusion that practically coincide with the dates indicated.

### 3.3.2. Authors

With regard to authors, a relevant aspect is the average number of authors per article, because this trend has changed in recent decades. This aspect concerns how science is conducted and disseminated, and the current reality seems to be a transformation from the individual or “author” to a co-authorship or “committee” [28]. With this idea in mind, the frequency (Figure 4) was observed on the basis of the number of authors per article. If we calculate the average value, this would be 6.9 authors.

The affiliations and areas of the authors in the 50 most-cited articles reveals a complex web of collaboration, both within and across national borders (Figure 5). If authors listed multiple affiliations or countries, these were included in the tally, illustrating the extent and nature of their collaboration. Often, such collaborations span multiple institutions within a single country, with instances where each author comes from a different entity.

Notably, in 19 articles, authors from two different countries participated, and on 6 occasions authors from three countries collaborated. The United States and the United Kingdom stand out for cross-country collaborations, contributing to 13 and 10 articles, respectively (6 of which involved both countries, with a third country participating on 2 occasions). Australia follows with five works.

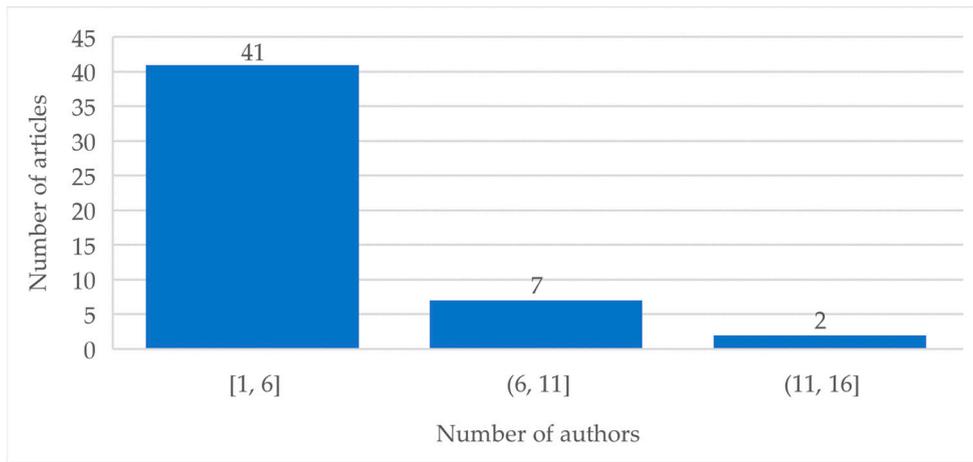


Figure 4. Frequency of authors per article. Source: own elaboration based on data from Scopus.

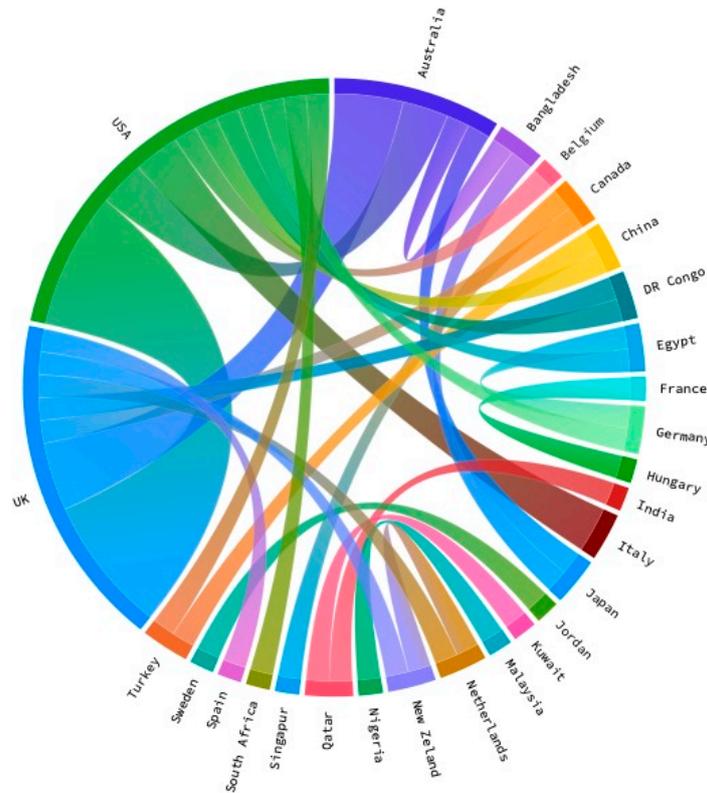


Figure 5. Country of origin by authors' affiliation. Source: own elaboration based on data from Scopus.

It is not surprising that this convergence encompasses these three countries, given the commonality of language—though in this case, one might expect some co-authorship between Latin American countries and Spain due to their linguistic ties—but it is also due to these countries' significant scientific output. The presence of such collaborations reflects not just shared linguistic and cultural backgrounds but also the robust academic and research environments that foster such interdisciplinary and international partnerships.

However, not all countries in the sample engaged in international collaborations; for example, Israel, Iraq, and Mexico each have one highly cited article without cross-border collaboration. In contrast, the remainder of the countries participated in at least one or two collaborative efforts, as can be seen in the graph.

Furthermore, the disciplinary backgrounds of the authors add another layer of interest. Only two articles in the sample are single-authored, whereas at the other extreme, there

are articles with 16 and 12 authors, showcasing a broad range of contributing fields (it is notable that the article with 16 authors includes collaborators exclusively from institutions across the United States).

A total of 19 articles benefit from multidisciplinary perspectives, with 15 of these featuring authors from different countries. Table 6 outlines the most represented disciplines:

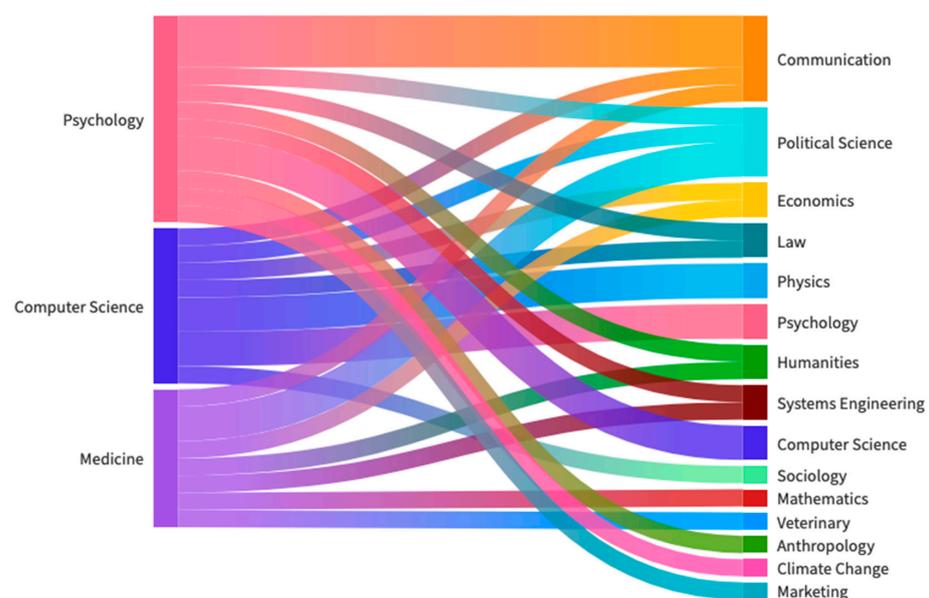
**Table 6.** Authors' disciplines.

Field <sup>1</sup>	Articles in the Sample	Collaborative Articles (with One or More Fields)
Psychology	14	7
Medicine	14	7
Computer Science	12	7
Communication	8	4
Political Science	7	4
Systems Engineering	5	2
Physics	3	3
Economics	2	2
Humanities	2	2
Mathematics	2	2
Anthropology	1	1
Climate Change	1	1
Law	1	1
Marketing	1	1
Sociology	1	1
Veterinary	1	1

Source: own elaboration based on data from Scopus. <sup>1</sup> The fields represent the specialties of the different authors according to data from Scopus and the websites of the institutions where they work.

These data emphasize that while less represented disciplines contribute their expertise to the discussed topics, they typically do so within a multi-author framework that includes at least one author from a different field, enriching the article's multidisciplinary approach. The domains of Psychology, Medicine and Computer Science (potentially combined with Systems Engineering) not only are the most prevalent among the most-cited articles but also engage most frequently in collaborative publishing.

Lastly, Figure 6 illustrates the intersections of the three most common disciplines, highlighting the interdisciplinarity at the heart of these influential publications.



**Figure 6.** Collaborative relationships between disciplines. Source: own elaboration based on data from Scopus.

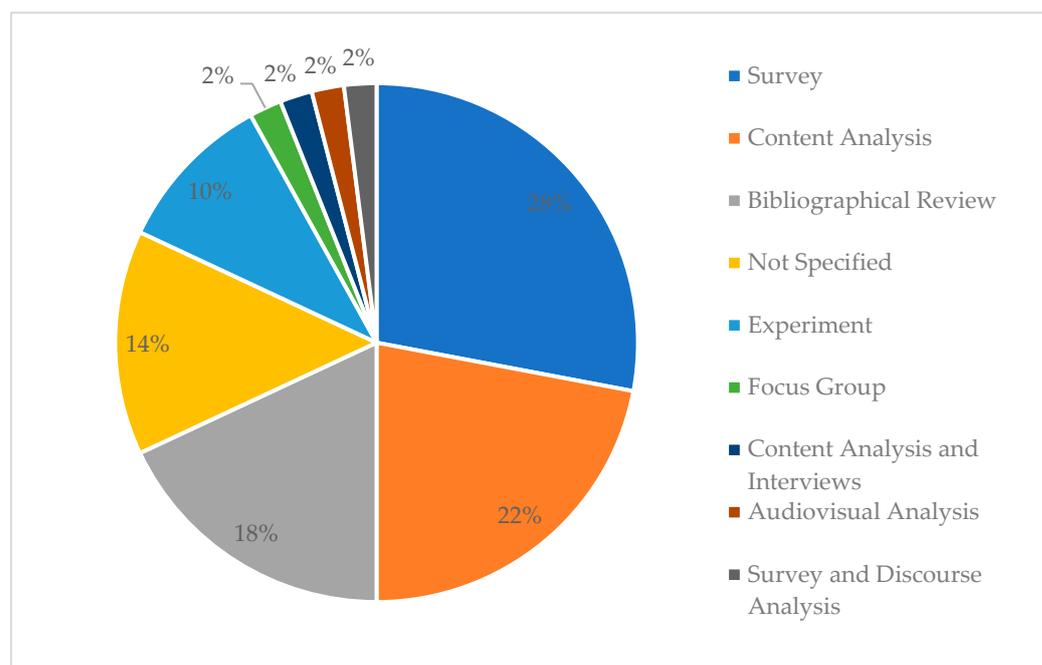
Only five fields converge on more than one occasion, with Psychology and Communication reaching the highest figure, occurring in three different articles. One of these instances pertains to the article with 16 authors, in which five different fields intersect.

Furthermore, within these broader disciplinary categories, collaborations have been noted with specialists in highly specific fields. These include radiologists, crisis management experts and infectious disease specialists, showcasing the depth and diversity of expertise contributing to the research.

### 3.3.3. Methods

As a final part of the analysis of these 50 articles, attention was paid both to the type of methodology employed and the technique used. There is a dominance of quantitative research (64%) as opposed to qualitative research (26%), followed by papers in which this is not explicit (6%) and those using a mixed methodology (4%).

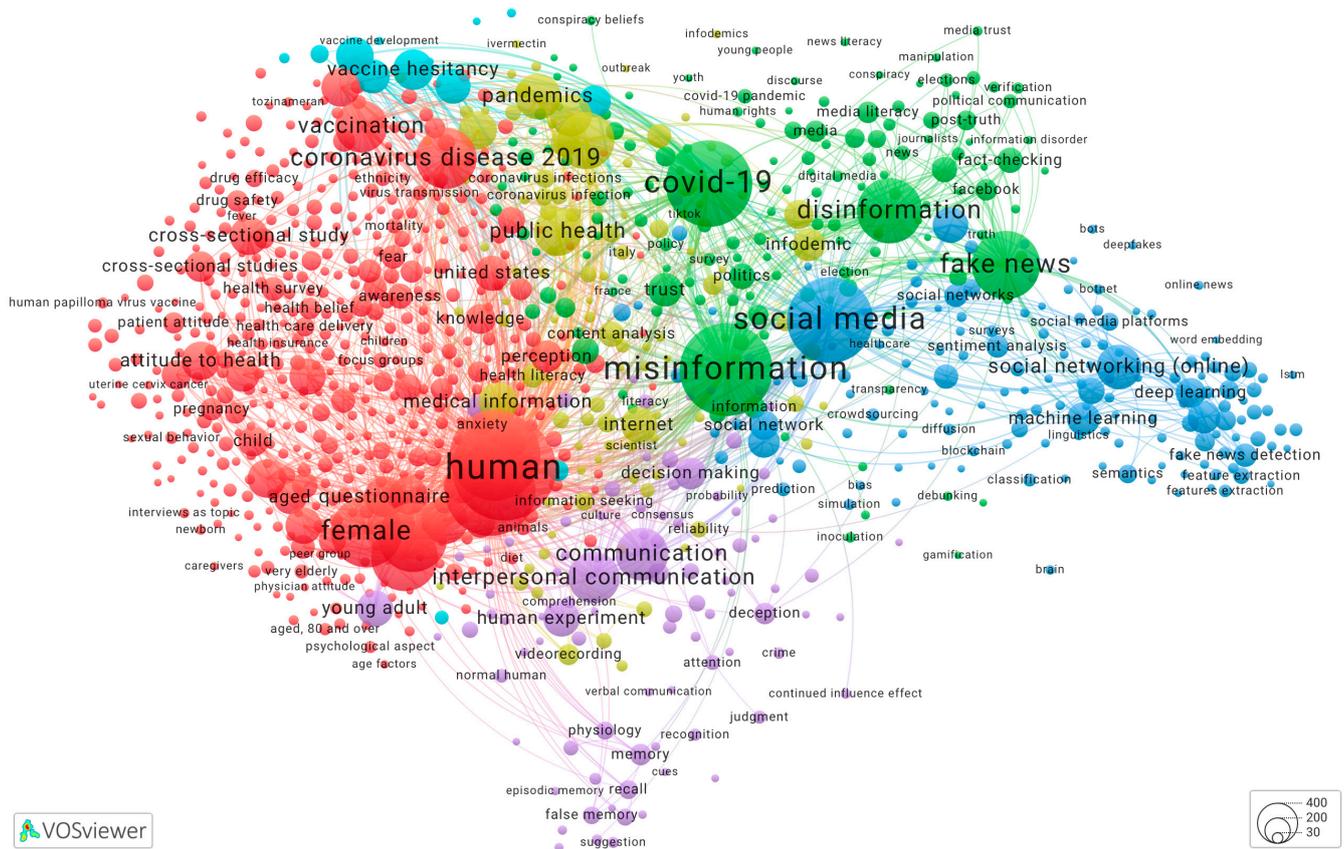
In line with the above, Figure 7 shows the most frequent techniques used in research. As previously noted, the prevalence of quantitative methodologies is reflected in these data, where 28% of the articles ( $n = 14$ ) used surveys as a means to achieve their objectives. Similarly, several modalities of surveys are used, for example, online or by telephone, and are carried out on sample groups of different sizes. The application of both single surveys and multistage surveys to the population analyzed have also been observed, thus serving to obtain comparative results.



**Figure 7.** Distribution by techniques used. Source: own elaboration.

Content analysis was also one of the most common techniques, representing 22% of the total ( $n = 11$ ), and was detected in both quantitative and qualitative applications. Literature reviews were the most commonly used qualitative technique, in third position, representing 18% of the total ( $n = 9$ ). This was followed by those studies in which the technique was not specifically mentioned in the research design, representing 14% of the total ( $n = 7$ ), and those that used experiments, representing 10% of the sample ( $n = 5$ ). From this point on, the figures drop to 2%, which means that the numbers of works that opt for the rest of the techniques were marginal.

To finalize the profiling, the keywords with which all the texts indexed in Scopus were tagged from authors and from Scopus itself were taken as a reference, and a keyword co-occurrence map was created (Figure 8) in order to synthesize the research on disinformation.



**Figure 8.** Keyword co-occurrence map. Source: own elaboration.

Although the size of these words reflects the most frequent interests in this field, the number of labels highlights the multidisciplinary nature of the various possible points of view when addressing disinformation as an object of study in academic research.

Terms related to specific areas such as medicine, social media, journalism or technology are clearly identifiable. These areas have also been identified through the disciplines of the authors, thanks to the systematic study of the 50 most-cited articles. Additionally, transdisciplinarity is manifested in the visualization through the connections between different terms, ranging from “human” to “communication” and “interpersonal”. These connections form six clusters that can be generally categorized within the highlighted areas.

At first glance, it is apparent that Public Health themes are among the most repeated, with terms like “COVID-19”, “vaccination”, and “public health” showing the direct influence of the pandemic on disinformation research. This underscores the urgency of understanding how misinformation spreads on critical health issues.

Another evident relationship is the link between “disinformation” and other terms that allude to disinformation, with terms related to social media references, such as “social network”, “social media platforms” or “social media”, with the latter being one of the most significant channels for studying the spread of disinformation.

Lastly, another notable aspect is the words related to technology, such as “fake news detection”, “big data” or “machine learning”, indicative of the interest in using technology to identify and counter disinformation, which may be a promising direction for future research.

#### 4. Discussion and Conclusions

Although the results presented in the different sections address the questions raised in the first part of the article, it is essential to re-cover some key aspects.

The bibliometric analysis has offered a comprehensive view on the evolution and current state of academic research on disinformation. An exponential growth in the literature

on this issue has been identified, especially in the fields of Medicine, Computer Science and Psychology (although journals categorized as multidisciplinary ranked second), as confirmed in the sample of the 50 most cited articles with the disciplines most represented among their authors. This increase reflects a greater academic awareness and concern regarding the subject. The journals identified as leaders in publishing on disinformation demonstrate a diversity of approaches and fields, underscoring the interdisciplinary nature and complexity of disciplines and countries from authors' affiliations. This plurality suggests a growing need for transdisciplinary collaboration to effectively address the challenges presented by disinformation.

In relation to the origin of disinformation research, this study reveals a remarkable variety in terms of authors, areas of expertise and country of origin. Contrary to concentrating on a few authors, there is a wide range of researchers addressing this issue. For example, if we look at the profile of the authors, Anglo-Saxon men in the field of psychology predominate, but as far as universities are concerned, North American institutions are the most prominent, thus reflecting the multifaceted quality of research in this field.

Regarding the level of content, the systematic analysis of the most cited publications identified predominant and emerging themes in disinformation research. The frequent mention of COVID-19 evidences how global events influence research topics. In addition, there is an evolution in the topics of interest, from more general aspects of disinformation to more specific and solution-oriented approaches, with a special mention to the presence on social media. The diversity in methodologies and approaches underlines the complexity of the field and points to the importance of continuously adapting research methodology to keep up with the changing nature of disinformation, but also the need for multidisciplinary strategies to address this issue.

Another research interest recorded amongst the articles cited is the concern regarding climate change and knowing what kind of information is published, as well as the vulnerability of the population in assessing it and identifying it as disinformation.

From a sociological perspective, we can speak of the emergence of publications in the area of psychology highlighting the importance of understanding the social and personality aspects which are influenced by disinformation, including its impact on public opinion and social behavior. This trend reinforces the need for approaches that address not only the content of disinformation, but also its broader social implications.

In short, this systematic bibliometric analysis highlights the importance of disinformation as an object of study, which is evident from the initial figures. From the picture described here, future research can be oriented to fill gaps, go a step further than the most common themes and areas and respond to emerging challenges, or those less studied, in this field of study.

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