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Media Coverage of China During COVID-19: A Systematic Review

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Abstracts

The first case of COVID-19 appeared in China in late 2019, followed by a global outbreak of the virus. There are many articles examining the content of media coverage of China, but the topics examining media coverage of China during COVID-19 are still very new and have not been adequately studied. Knowledge related to Media coverage of China during COVID-19 was analyzed and visualized using CiteSpace software with the Web of Science Core Collection as the data source. The main findings suggest that media coverage of China during COVID-19 is a relatively recent topic of research. (1) The three most influential journals in this area are Communication, Psychology Multidisciplinary, and Public Environmental Occupational Health. Zhang W., Chen Q, et al. are among the most influential authors. (2) Co-author networks are decentralized, whereas transnational collaborations take place in groups. 10 clusters are considered to be of high interest, of which "covid-19 governance" "contesting coronavirus narrative" "understanding public protective behavioral intention" has persisted to this day. (3) Thirteen emergent terms illustrate the evolution of the field's research frontiers, the earliest being "social media," "fake news," etc., followed by "support," "emotions," "media," etc., and finally "media satisfaction" and "media perceptions."Finally, its contributions, limitations and directions for further research are discussed. The findings of this study predict future trends in research on media coverage of China during COVID-19 and provide a basis for more in-depth research.

Keywords: media coverage, COVID-19, China, knowledge map, bibliometric analysis, CiteSpace

1. Introduction

In December 2019, a person in Wuhan, China contracted unexplained pneumonia, later renamed COVID-19 (Wu, & Shen, 2022).On January 31, 2020, the World Health Organization officially declared the COVID-19 pandemic a public health emergency of global concern, and on March 11, it was declared a pandemic (Pofi, & Leung, 2022). The pandemic crisis has caused panic among people from all over the world, and more attention has been devoted to China, where the virus originated.

How the Chinese government is managing and controlling the pandemic, health advice from medical experts, and the number of infections and deaths caused by the pandemic are all things that people are eager to learn about, and the media is uniquely positioned to be a major source of information (Gui, 2021). Both traditional and social media play an important role in conveying information related to the COVID-19 outbreak (Obi-Ani, Anikwenze, & Isiani, 2020). The measures and advice from experts on how to deal with the outbreak are what people urgently need to know during a crisis. However, compared with social media, the audience is much more passive in front of traditional media, and it is difficult to pass news actively through traditional media. Social media is much more popular in terms of passing messages and exchanging opinions with each other (Morris, Teevan, & Panovich, 2010). Social media has also become an important channel for people to get information about diseases (Schmidt, 2012). Governments around the world have also begun to use social media to deliver pandemic-related information, to assess public sentiment in a timely manner, to maintain social stability, and to help with disaster relief (Li, Chandra,, & Fan, 2022). However, the lack of gatekeepers and laxity in the review of social media has also led to the transmission of a lot of misinformation, which aggravated people's emotional anxiety and panic during the severe period of the COVID-19 pandemic (Jiang, Huang, Cheng, Zhang & Huang 2021).

2. Literature Review

By analyzing the existing studies in this field, we found that scholars' studies on "media coverage of China during the COVID-19 period" mainly focus on two areas. The first area focuses on the impact of media reports. Some scholars have found that the content of these reports has influenced public perceptions of China and the Chinese government at home and abroad (Gong, & Firdaus, 2022; Zhang, & Shaw, 2021). The image of China has begun to turn negative as some Western media outlets have labeled China unfavorably, such as "Chinese threat" and "Chinese influence" when reporting on the COVID-19 pandemic in China (Wanning, 2021). The second area focuses on what reporting strategies are used by the media for the purpose of influencing the public (Wang Lee, Wu, & Shen, 2020; Ngai Singh, Lu, & Koon, 2020; Sing Bik Ngai Yao, & Gill Singh, 2022). Scholars such as Wang Lee, Wu, & Shen (2020) found that setting specific hashtags on social media can achieve the purpose of influencing the public. Other scholars have suggested that some media outlets also adapt narrative strategies to influence the public when reporting on pandemics in China (Ngai, Singh, Lu, & Koon, 2020).

A systematic study of the literature in the field is needed to know the major research themes and research directions of scholars in the field (Linnenluecke, Marrone, & Singh, 2020). Both quantitative and qualitative research methods are frequently used in systematic research, and both methods facilitate the researcher in arriving at an accurate response to the question under study (Petrosino et al., 2001). In addition, there have been many studies of bibliometric and systematic reviews related to media content worldwide (Kubin, & Von Sikorski, 2021; Sisask, & Värnik, 2012; Rees, Robinson, & Shields, 2019; Wang, McKee, Torbica, & Stuckler, 2019). Their systematic reviews focused on the content of media coverage of politics (Kubin, & Von Sikorski, 2021), psychological health (Sisask, & Värnik, 2012), sports (Rees, Robinson, & Shields, 2019), misinformation (Wang, McKee, Torbica, & Stuckler, 2019) for coverage. There are certainly bibliometric and systematic reviews done by some researchers focusing on different pandemics and outbreaks, exist (Fung et al., 2016; Klemm, Das, & Hartmann, 2016; Chew, & Eysenbach, 2010; Pilipiec, Samsten, & Bota, 2023). These pandemics and outbreaks are Ebola virus (Fung et al., 2016), Swine flu (Klemm, Das, & Hartmann, 2016, Chew, & Eysenbach, 2010) and other infectious diseases (Pilipiec, Samsten, & Bota, 2023). & Bota, 2023). Of course, there are also researchers who have focused on systematic reviews of media content during the COVID-19 pandemic, with a focus on vaccination (Cascini, 2022), misinformation (Gabarron, Oyeyemi, & Wynn, 2021), mental health (Marciano, Ostroumova, Schulz, & Camerini, 2022), and others. However, few bibliometric and systematic reviews have been done on the findings of the media coverage of China during the COVID-19 period.

The emergence of the COVID-19 pandemic has brought a huge crisis to the world, and the study of COVID-19 has become the focus of scholars' attention in the past few years. And the study of how the media reported on the pandemic in China, what contents were reported, what communication strategies were adopted, and what impacts were produced in the end has also become an important part of scholars' attention. This paper presents a bibliometric study of media coverage of pandemics in China, hoping to provide an overall picture of the field by exploring the evolution of hotspots in the field. Visualization and analysis of trends and patterns in the literature based on the ISI Web of Science/ Social Science Citation Index (WoS/SSCI) using CiteSpace software is an important methodology to achieve the goals of this study (Ye, Kueh, Hou, Liu, & Yu, 2020).

This paper attempts to systematically review the literature in the field, with the aim of examining what topics scholars have mainly focused on when studying social media and traditional media pandemics related to China, and what are the directions for future research. The expectation is to fill the gaps in the field. This study is important because it provides information on the level of interest in the peer-reviewed literature, which can help researchers understand the main focus of scholars in the field and understand the evolution of research topics. This study is useful because it provides information on the extent to which peer-reviewed literature can help researchers to keep abreast of the research developments in the field in order to understand the future direction of research in the field.

In particular, the following research questions are addressed:

RQ1: To what extent has "media coverage of China during COVID-19" received attention in the current literature?

RQ2: What were the main themes of the existing study on "Media Coverage of China during COVID-19"?

RQ3: What are the research gaps and directions for future research?

3. Methodology

3.1 Source of Data

A systematic review of scholarly networks supports the use of scientifically based metrics for analysis (Chen, 2017). Che, Kamphuis, Zhang, Zhao, & Kim, (2022) used this approach to analyze research hotspots related to crisis and risk communication during COVID-19. Kang, & Liu, (2023) also used this method in their study of trends in public opinion during the COVID-19 pandemic. These research examples provide a good reference for choosing research methods.

WoS/SSCI databases are frequently chosen for doing this type of research (Meschede, 2020). WoS is the most widely used literature repository, including SCI, SSCI, A&HCI, ESCI, CPCI, etc., covering more than 12,000 top journals worldwide (Gizzi, & Potenza, 2020). Therefore. in this study, the WoS/SSCI database was chosen as the source of data, and the search terms under the subject categories were "COVID-19 OR SARS-CoV-2 OR coronavirus OR corona virus", "media OR newspaper OR radio OR television", and "China".The search period was from January 1, 2020 to August 6, 2023, excluding non-journal articles such as journal catalogs, book reviews, conference announcements, etc.. (1) Only journal articles and conference papers were retained; (2) Only the discipline was covered; (3) English version only. In the end, a total of 514 pieces of raw data meeting the requirements were collected and organized.

3.2 Analytical Tool

The analytical tool used in this study is CiteSpace, a bibliometric modeling software developed by Jomei Chen of Drexel University (Chen, Ibekwe-SanJuan & Hou, 2010). It visualizes to analyze trends and patterns in the scientific literature. The subjective bias of narrative literature reviews is overcome through this systematic, transparent, and repeatable review process. CiteSpace supports many types of bibliometric studies, including institutional co-citation analysis, author collaboration network analysis, and visualization of topic and domain co-occurrence. It uses scientific mapping procedures to help visualize and analyze the structure, dynamic patterns, and trends of the field, enabling researchers to visually identify the evolutionary paths of disciplinary frontiers and the classic foundational literature. The data can be analyzed for different aspects such as keywords, authors, institutions, countries, categories, etc. of the downloaded data and also their co-citations can also be analyzed. The software is also simple and fast, with simple data format conversion and easy to operate.In this paper, we will use the bibliometric analysis tool, CiteSpace, to analyze research findings in the field of media crisis event coverage research in recent years. To provide a valuable overview of the history of the research and to identify the structure of the field, dynamic evolutionary patterns and emerging themes. with a view to informing scholars of subsequent research.

4. Research Overview

4.1 Number of Publications by Year

In order to better analyze the trends in this research area of media coverage of China during COVID-19, Figure 1 shows the number of papers published in this area each year. Because COVID-19 occurred at the end of December 2019, the first paper in the field appeared in 2020, and the first three years show an increasing trend. In 2020, 54 articles were published, which is 11% of the total number of articles. In 2021, 140 articles were published, which is 27% of the total number of articles.In 2022, 222 articles were published, which is 43% of the total number of articles.In 2023, 98 articles were published, which is 19% of the total number of articles, which is a year with significantly fewer publications than the previous year. This is due to the fact that the data collection date for this paper was August 6, 2023, and therefore publications from later in 2023 were not included in this dataset. The statistics show an increasing trend in the number of articles published in the first three years. Judging by the number of studies published in the last few years, the academic community is interested in this topic now and in the coming years.

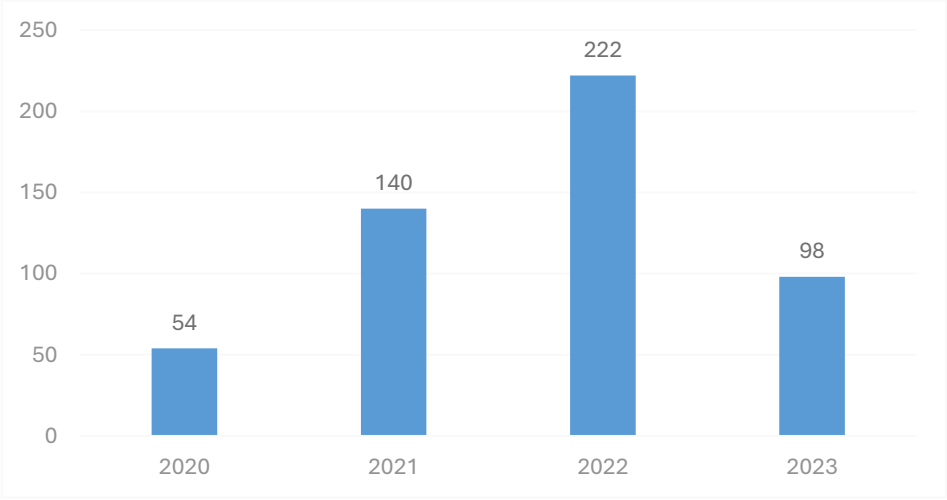

Figure 1. Number of publications over years

4.2 Source of Publication

This section describes the distribution of publications in different journals. Table 1 lists the top 10 journal categories that published the most articles in the field of MCC during COVID-19. It was found that a total of 86 journals published 514

articles related to the topic. Among them, 23.93% (123 articles) were published in the journal "Communication", which is the journal with the most publications. Psychology Multidisciplinary" (10.895%), followed by "Public Environmental Occupational Health" (9.339%), "Environmental Sciences" (6.42%), "Area Studies" (4.864%) and "Computer Science Information Systems"(4.086%). These are the top journals and top ranked publishers in the field area.

Table 1. Top 10 journal categories

Journal Name	Number of articles	%
Communication	123	23.93
Psychology Multidisciplinary	56	10.895
Public Environmental Occupational Health	48	9.339
Environmental Sciences	33	6.42
Area Studies	25	4.864
Computer Science Information Systems	21	4.086
Political Science	20	3.891
Social Sciences Interdisciplinary	20	3.891
Sociology	20	3.891
Business	19	3.696

4.3 Author and Co-authorship Analysis

The core author/team analysis is mainly based on the author knowledge graph and the number of scholarly publications as evaluation indicators (Ye, Kueh, Hou, Liu, & Yu, 2020). We used CiteSpace software to analyze the collected 514 data to visualize a more intuitive network of relationships among authors. Because the study was conducted during the COVID-19 pandemic, the time span was from 2020 to 2023, and the time slice was one year. Authors were selected as the node type and Figure 2 was obtained after running CiteSpace.Where nodes represent the amount of scholarly publications, the more scholars publish, the larger the diameter of the node; the links between the nodes represent the academic cooperation between scholars. According to the results after the run, it can be seen that the author network has 135 nodes and 65 links. This indicates that although there are 135 authors who publish top papers, there are only 65 with collaborative relationships. As shown in Figure 2, the loose network links with a network density of only 0.0072 suggests that most authors chose to complete their research independently and rarely collaborate with other authors with high intensity.

From 2020 to 2023, there are seven authors who have published three or more articles, namely Zhang W. (4 articles), Chen Q. (4 articles), Wang R. (3 articles), Gong J.k. (3 articles), Ngai C. S. B. (3 articles), Chen, I.H. (3 articles), Yao L. (3 articles). It shows that their contribution to the study of media coverage of COVID-19 in China is large, and their research results have important reference value and have certain authority and discourse power in academic research.From Figure 2, it can be seen that the research teams are constructed in different forms.The research team centered on Ferrara E., Liu, Y.F., Li, Y.R. is a "straight line" team. Yao L., Singh R. G., Ngai C.S. B. and other authors are working in a stable teamwork, which is a "triangular" team. The research team centered on Gong J.k, Chen I. is a "polygonal" team with close internal connections, which has the largest number of nodes and the highest density of academic exchanges and cooperation. As a result, although most authors choose to conduct research independently, there are some research teams with stable structures, clear directions and strong academic contributions. The clustering effect of academic resources will bring about an increased focus on research in this field. Creating a scaled, scholarly and shared academic community.

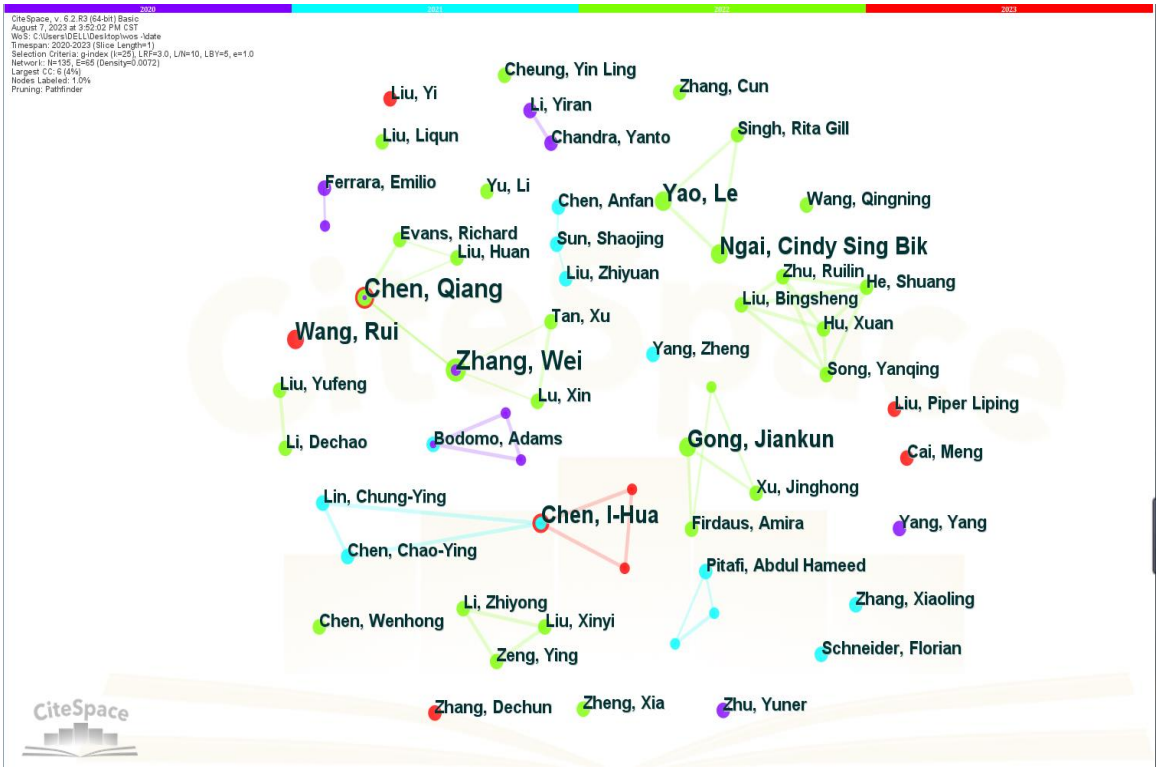

Figure 2. Author collaboration network analysis

4.4 Affiliation Analysis

The organizational distribution of the 514 articles in this literature was analyzed as shown in Table 2. It was found that N8 Research Partnership had the most articles with 23 articles. This was followed by Hong Kong Polytechnic University and University of California System, both with 14 articles. After comparing the top 10 institutions in terms of paper production, it is found that 8 research institutions are located in China. These 8 research institutions published a total of 76 papers in their field, accounting for more than 67% of the paper output of the top 10 institutions. This implies that China and these universities were very concerned about the media coverage of China during COVID-19. This may be because (1) China was concerned about media coverage of its country during the COVID-19 pandemic, and was worried about how the country's image would be affected by such coverage (Jia, & Lu, 2021). (2) National leader Xi Jinping has repeatedly emphasized the need to focus on the issue of national image (Klimeš, 2017).

Table 2. Top 10 organizations with largest number of publications

Name	Country	Number of article
N8 Research Partnership	UK	23
Hong Kong Polytechnic University	China	14
University of California System	USA	14
Beijing Normal University	China	10
University of Hong Kong	China	10
Chinese University of Hong Kong	China	10
University of Macau	China	9
Chinese Academy of Sciences	China	9
City University of Hong Kong	China	7
Chongqing University	China	7

4.5 Country/Region Analysis

Table 3 shows the top 10 countries in terms of the number of publications in this field. Since the target country of this field is China, as expected, China is the country with the highest number of publications, with a total of 304 publications, accounting for 59.14% of the total number of publications in this field, which is more than half of the total.

This is followed by USA (114 publications), ENGLAND (57 publications), and AUSTRALIA (21 publications). Interestingly, among the top 10 countries, all of them, except China, are economically developed countries. The United States is the country most concerned with this area after China. UK, SPAIN and ITALY are European countries and CHINA, RUSSIA and KOREA are Asian countries, which shows that Europe is as concerned as Asia about China's presentation in the media during COVID-19. It is worth noting that if an article published is written by two individuals from two different countries, the publication will count towards the number of publications from both countries.

After changing the running nodes of CiteSpace to countries, the running out result is as Figure 3. In Figure 3, the cooperation between countries can be clearly seen. The network has a total of 63 nodes, 60 links and a density of 0.0307. It can be found from the Figure 3 that China cooperates more closely with the United States and Taiwan, China. The UK, on the other hand, cooperates more closely with countries such as India and Canada.

Table 3. Top 10 countries/regions with most publications

Country	Number of article	%
PEOPLES R CHINA	304	59.14
USA	114	22.18
ENGLAND	57	11.09
AUSTRALIA	21	4.09
TAIWAN	17	3.31
SPAIN	12	2.33
ITALY	12	2.33
SINGAPORE	12	2.33
RUSSIA	12	2.33
SOUTH KOREA	11	2.14

Figure 3. Country collaboration network analysis

5. Co-citation Analysis

The relationship between two publications and articles that are cited in the same article is called co-citation (Wu, Long, Yang, Wang, Chen, 2022). The analysis of co-citation provides a clear picture of whether a publication and paper has influenced the literature in the field (Ye, Kueh, Hou, Liu, Yu, 2020). There is a large amount of literature in this field. To quickly identify the core literature with high contribution, co-citation analysis of literature dataset is a good choice (Li, & Chen, 2016). CiteSpace software is one of the better software to analyze the co-citation situation.The 10 most cited authors after analysis are shown in Table 4, and the visualized clustering relationships are shown in Figure 4. Because COVID-19 is a global public health issue, it is not surprising that WORLD HEALTHORGANIZATION, with

46 citations, is the most cited author. The next most cited author is CHEN Q with 38 citations, 8 less than the first place. In order to show the core keywords of each cluster more clearly, a visual cluster analysis of the cited authors was performed, as shown in Figure 4, while the highly cited authors of each sub-theme are also shown in the figure. It shows that the article of WORLD HEALTH ORGANIZATION is one of the core cited papers in the Social network analysis cluster, while the article of CHEN Q is one of the core cited papers in the Institutional trust cluster.

It is the same as above using CiteSpace, but after changing the node type to "reference", the exact number of cited references will be generated. As shown in Table 4, Chen's articles have been widely cited in the research in this field, with 31 papers or publications citing his articles, which indicates that Chen's research results have contributed greatly to the development of the field.Chen's main contribution was to propose that affective valence would moderate media richness. He also proposed a theoretical model of citizen engagement through government social media (CEGSM).The relationship between emotional valence moderating media richness, dialog loops, content type, and CEGSM is further explained (Chen et al., 2020). In addition to this article, another article published by him in 2021 is listed in Table 4, "Factors Driving Citizen Engagement With Government TikTok Accounts During the COVID-19 Pandemic. Model Development and Analysis" (Chen, Min, Zhang, Ma & Evans, 2021) is also highly cited in this field.

Table 4. Top 10 authors and articles cited

Author	Cited Frequency	Article	No. of citations
WORLD HEALTHORGANIZATION	46	Chen Q, 2020	31
CHEN Q	38	Zarocostas J, 2020	19
HAIR JF	33	Liao QY, 2020	14
YANG Y	32	Tian HY, 2020	10
ENTMAN RM	30	Gao JL, 2020	10
FORNELL C	27	Chen Q, 2021	9
KING G	27	Zhao YX, 2020	9
PODSAKOFF PM	26	Hart PS, 2020	9
COOMBS WT	25	Han XH, 2020	9
WANG Y	25	Depoux A, 2020	8

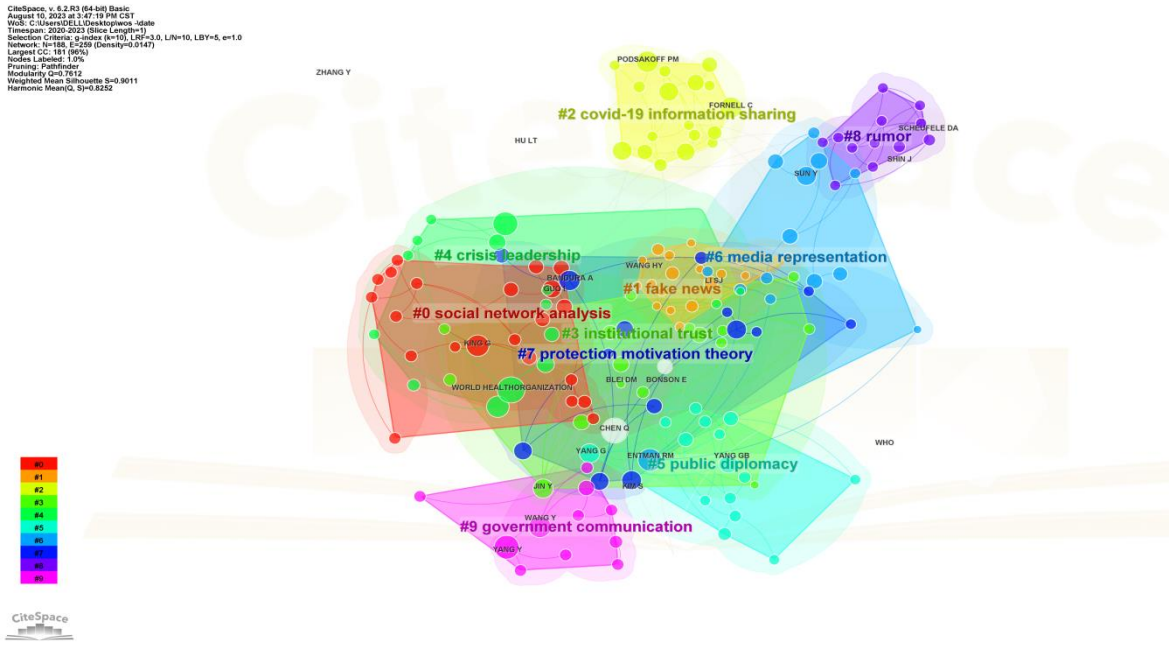

Figure 4. Cited author co-citation clustered analysis, Nodes=188 , Links=259

On the other hand, Zarocostas J. is also known for his "How to fight an infodemic". Every time there is an outbreak of an epidemic, there is an influx of information in the media, like a tsunami, but not all of this information is correct, and there is a lot of misinformation and disinformation (Zarocostas, 2020). False information in the media is also one of the research focuses in this field, and scholar Liao et al. (2020) also focused on this topic and did a research on it. Top papers by other authors, such as focusing on mental health issues and media exposure during the COVID-19 outbreak (Gao et al., 2020); reviewing the content of concerns about the COVID-19 outbreak on Chinese citizens' social media (Zhao, Cheng, Yu, & Xu, 2020); Politicization and Polarization in COVID-19 News Coverage (Hart, Chinn & Soroka, 2020), etc. These literature are highly cited in different topics in the field.

6. Hotspot Analysis

The keywords of publications and papers give an idea of what is important for researchers to study (Chen & Xiao, 2016). Analyzing the keyword co-occurrence and intensity of a statistical dataset in a certain field can clarify the hotspots and frontiers of research in the field (Chen & Xiao, 2016). This goal can be analyzed by CiteSpace software by changing the key node to "keyword". Since the search terms for data collection are "media", "China" and "Covid-19", the nodes in the keyword co-occurrence visualization Figure 5 have a larger diameter, indicating that they appear more frequently. In addition, the words "communication", "information", "news" and "politics" have also attracted much attention from researchers. The network has a total of 238 nodes and 362 links with a network density of 0.0128, which indicates that the keywords are somewhat related to each other, but not closely.

The keywords of the collected dataset were further sorted according to frequency and centrality in accordance with high to low and strong to weak and the top 10 keywords were extracted respectively as shown in Table 5. The higher frequency of the keywords indicates that these are the research hotspots in the field. Keyword centrality has a slightly different meaning from frequency, which is an important reference for measuring the influence of keywords. Higher centrality indicates that the keyword or topic has a greater influence on the development of the field, and they are also considered to have important connections with other research topics. Keywords with higher frequency do not necessarily have higher centrality; there is no necessary connection between the two. From Table 5, it can be found that among the top 10 keywords in terms of frequency and centrality, there are no identical ones except "China" and "Twitter". The keywords "social media" and "impact" appear most frequently, with 138 and 47 respectively, followed by the keywords "media" (44), "china" (36), "communication" (35), and "information" (34). 44), "china" (36), "communication" (35) and "information" (34). On the other hand, the keyword "adoption" has the highest centrality of 0.29. The centrality of the keywords "participation", "twitter", "coverage", "outbreak ", "china", and "discourse" have a centrality between 0.22 and 0.16. Although the keywords with higher frequency rankings and the keywords with higher centrality rankings are not consistent, what is consistent is that these are the topics that are highly discussed in the field and they contribute to the development of the field from different perspectives.

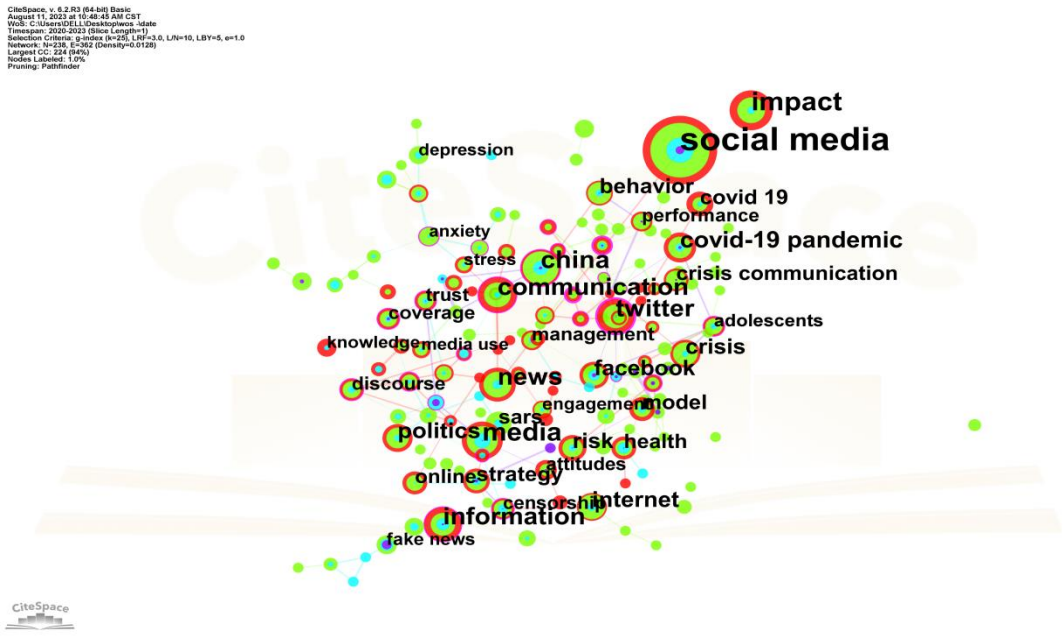

Figure 5. Co-occurrence analysis of keywords, Nodes=238, Links =362

Table 5. Top 10 keywords according to frequency and centrality

Keyword	Frequency	Keyword	Centrality
social media	138	adoption	0.29
impact	47	participation	0.22
media	44	twitter	0.2
china	36	coverage	0.2
communication	35	outbreak	0.19
information	34	china	0.16
news	34	discourse	0.16
twitter	34	activation	0.16
covid-19 pandemic	29	censorship	0.15
internet	24	adolescents	0.14

After analyzing the co-occurrence of the keywords in this domain, the keywords were continued to be clustered and analyzed using the Log-likelihood ratio (LLR) clustering algorithm using CiteSpace software. After categorizing and summarizing the keywords, a total of 10 clusters with clear boundaries and high internal consistency were generated, as demonstrated in Figure 6, and more details of these knowledge clusters are also shown in Table 6. In addition, the network modularity index is 0.7668, which is more than 0.5, indicating a reasonable network structuring for research in this field.The network Mean Silhouette is 0.9123, indicating that its clustering results are reasonable and effective, the keyword subgroups are better clustered, and the internal consistency of the nodes within the clusters is high. All these data indicate that this clustering is valid and suitable for analysis. From these clusters, it is possible to find the media's attention and reports on different aspects of China's COVID-19.

From Table 6, it can be found that the high internal homogeneity (silhouette) values are between 0.85 and 0.97, all of which are greater than 0.7, which indicates that the nodes within the clusters are highly homogeneous and well-matched, and the clustering is effective. Cluster 0 relates to covid-19 governance where the study contains covid-19 pandemic, social media, social media use, mediation model, media use. The main theme of cluster 1 is using social media which includes covid-19 pandemic, social media, using social media, agenda setting and covid-19 crisis.Group 2 focus on the contesting coronavirus narrative where the study revolves around covid-19 pandemic, content analysis, western democracy and networked frame contestation. Cluster 3 associates with understanding public protective behavioral intention and the study links with covid-19 pandemic, social media, traditional media, media use and covid-19 vaccination. Cluster 4 relates to the study of chinese college students. Cluster 5 demonstrates the algorithmic awareness research. Cluster 6 shows the study of different epidemic period.

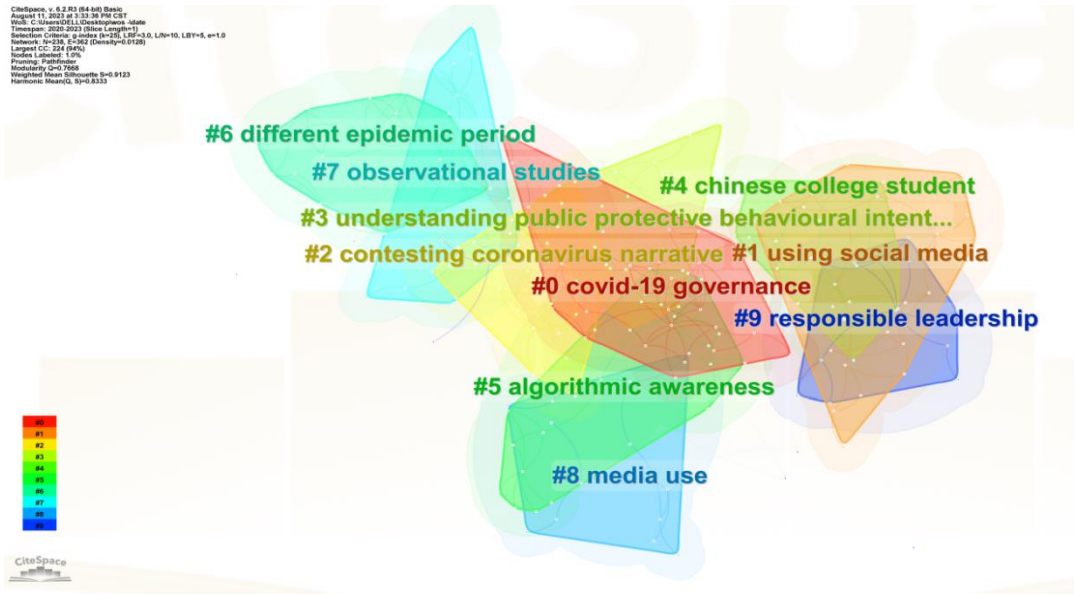

Figure 6. Cluster analysis of keywords

Table 6. The details of keywords in clusters

Cluster ID	Size	Silhouette	Top Terms（LSI）	Main Theme
0	27	0.854	covid-19 pandemic; social media; social media use; mediation model; media use	covid-19 governance
1	23	0.865	covid-19 pandemic; social media; using social media; agenda setting; covid-19 crisis	using social media
2	22	0.845	covid-19 pandemic; content analysis; western democracy; networked frame contestation; contesting coronavirus narrative	contesting coronavirus narrative
3	20	0.933	covid-19 pandemic; social media; traditional media; media use; covid-19 vaccination intention	understanding public protective behavioral intention
4	19	0.878	covid-19 pandemic; social media; systematic review; mediating role; internet use	chinese college student
5	18	0.949	covid-19 pandemic; social media use; mediating role; personality trait; internet use	algorithmic awareness
6	17	0.948	covid-19 pandemic; social media; protective behavior; longitudinal study; problematic use	different epidemic period
7	15	0.904	covid-19 pandemic; observational studies; systematic review; social media; college student	observational studies
8	13	0.965	covid-19 pandemic; social media; media use; social media use; covid-19 outbreak	media use
9	12	0.963	passive responsible leadership behavior; responsible leadership; corporate reputation; corporate social responsibility; customer loyalty	responsible leadership

With time researchers change their research topics, so analyzing temporal clustering using CiteSpace software reveals the pattern of keyword clusters over time (Ye, Kueh, Hou, Liu, & Yu, 2020). In the timeline view also known as Figure 7 it can be found how the terms and keyword clusters with more number of occurrences are transformed. In the timeline, the horizontal timeline is the changing clusters of terms and the markers of the keywords are also shown on the horizontal timeline and as in the previous analysis, the higher the frequency of the keywords, the larger the diameter of their nodes and the darker the node color. At the end of the timeline are the tag names for each cluster. Only the top 3 highest keywords are shown in each year. The time of the first co-occurrence of a keyword is indicated by the color of the link between the two words. For example, cluster #0#2#3#4#5#7 continues to 2023. The remaining clusters disappear in 2023. Keywords frequently used in these clusters are "social media" "media use" "impact" "politics", "news communication", "discourse". crisis", etc.

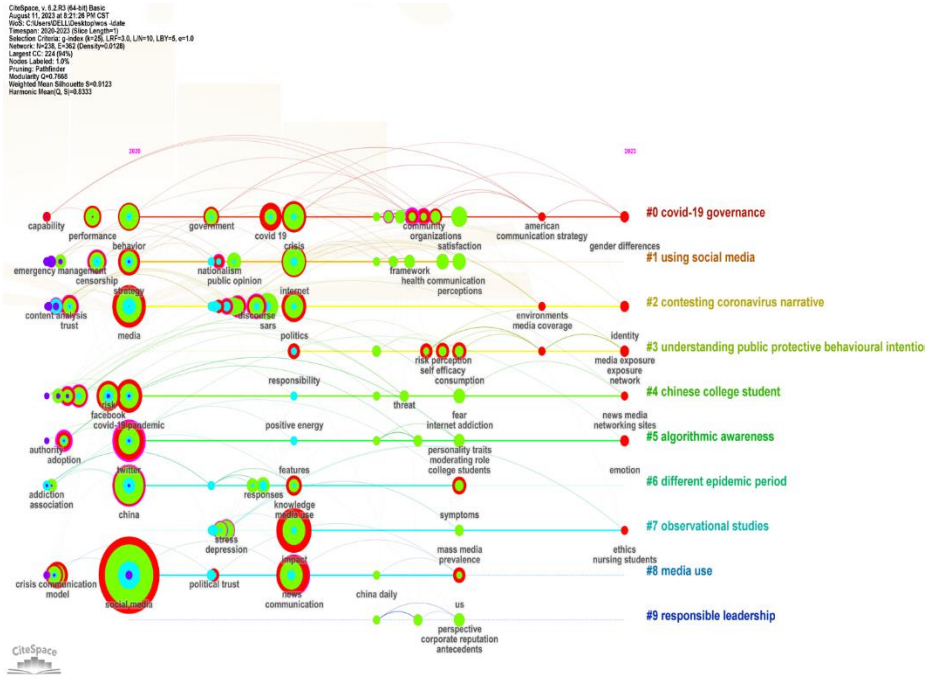

Figure 7. Timeline view of popular keywords in different clusters

7. Evolution Trend Analysis

7.1 Analysis of Research Frontier

To know the future research direction and development trend of a certain field, it is necessary to analyze the research trend of the field, and the burst term detection function in CiteSpace can help to complete this analysis Dang, (Dang, Luo, Ouyang, & Wang, 2021). As shown in Figure 8 and Figure 9, the analysis of this function can visualize the sudden increase in the use of specific keywords or specific citations in this field. As shown in Figure 8, the sudden keywords in this domain change over time. Since COVID-19 started its big burst in 2020, the first keyword appeared in 2020. Based on the data collated in the Web of Science core collection, a total of 13 emergent words such as social media are extracted.

In the study of media coverage of China during COVID-19 from 2020 to 2023, social media has the earliest emergence time in 2020 and the highest emergence intensity of 2.98. With the development of Internet technology, social media has become a common tool for the public to communicate with each other, especially when there is a public health emergency such as COVID-19 (Yang & Su, 2020). The majority of the public will choose to exchange information and opinions with each other on social media (Yang & Su, 2020). With the development of the pandemic, social media has become the main source of information about COVID-19, expert advice, prevention and control measures, and cases around the world can be seen on social media (Tran, Lu, & Van Nguyen, 2021). In addition according to the development of the pandemic, the country's epidemic prevention policy is also improving, after the policy is released, whether the attitude of the people is positive or negative will affect whether the policy can be successfully implemented (Sulistyawati et al., 2021). So the attitude of the people is also what the government managers need to understand, and social media is a good tool to utilize, after all, when the people use social media to communicate, their attitude towards the policy will be fully reflected in the social media. Because of the advantages of social media such as fast communication speed, the ability to use multimedia communication, and the ability to be interactive it has become a new staging ground for COVID-19 pandemic information (Gnach, Weber, Engebretsen, & Perrin, 2022), and therefore it has become the hottest topic in the field of media content research. Fake news is also a keyword that emerges with high intensity in this research area, this is because the outbreak of COVID-19 virus has put people in a great panic and they are in urgent need of information related to the virus, which provides opportunities for unscrupulous people to take advantage of the situation (Islam et al., 2020). The media ecosystem not only allows the dissemination of correct virus-related information, but also provides opportunities for the spread of misinformation and false news (N. Jolly, Samagandi, & M. Jolly, 2021). In addition to these two emergent words, the other emergent words in chronological order are content analysis、disasters、support、emotions、media、gratifications、panic buying、flu、machine learning、satisfaction and perceptions.

In addition to analyzing keyword bursts, this paper also analyzes the bursts of cited literature in this field, see Figure 9. As shown in Table 4, high-intensity bursts of articles such as Tian H.Y., 2020; Zhao Y.X., 2020 also appear in the list of highly cited articles. From the highly cited papers in a particular period, we can get a glimpse of the popular topics with rising attention in this period and understand the frontiers of research in this field (Ye, Kueh, Hou, Liu, & Yu, 2020). According to Figure 9, it can be found that the recent cited articles with strong emergence are Wang C.Y., 2020; Casero-Ripolles A., 2020; Larson H.J., 2020; Huang C.L., 2020; Chen Emily, 2020 and so on. Many articles in the field cite Wang's article. In the paper authored by Wang et al., (2020), he suggested that the outbreak of COVID-19 has affected the mental health of the Chinese population, and that to alleviate depression, anxiety, and other mental health problems, it is more important to meet the audience's need for accurate information .

The three articles that are still cited in 2023 are Zhao Y.X., 2020; Li Y.R., 2020 and Ngai C.S.B., 2020. Zhao Y.X. focused on people's topics related to the outbreak and the trend of concern on China's new media platform, namely Sina Weibo, in the pre-pandemic period of COVID-19. He analyzes the collected texts for participle, word frequency and sentiment analysis to understand the hot topics and their changes (Zhao et al., 2020). Li Y.R. focuses more on how the Chinese government and social media worked together during COVID-19 to address the dangers posed by public health issues. In his article, he points out that social media provided a favorable platform for the government to release information related to the outbreak, solving the problem of information overload and avoiding friction between all levels of government (Li, Chandra, Kapucu, 2020). Ngai C.S.B. aims to investigate what communication strategies can be used to promote active public participation in disseminating information about COVID-19. After analyzing how China Daily, the most widely read newspaper in China, used the online social networking site Sina Weibo to disseminate information about COVID-19, it was found that narrative style, content, and style all influence public engagement on social media (Ngai, Singh, Lu, & Koon, 2020).

Top 13 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	2020 - 2023
social media	2020	2.98	2020	2020	
fake news	2020	2.71	2020	2020	
content analysis	2020	2.43	2020	2021	
disasters	2020	1.87	2020	2020	
support	2021	1.5	2021	2021	
emotions	2021	1.46	2021	2021	
media	2020	1.46	2021	2021	
gratifications	2021	1.42	2021	2021	
panic buying	2021	1.42	2021	2021	
flu	2021	1.42	2021	2021	
machine learning	2021	1.42	2021	2021	
satisfaction	2022	1.89	2022	2023	
perceptions	2022	1.47	2022	2023	

Figure 8. Citation burst of keywords over time

Top 20 References with the Strongest Citation Bursts

References	Year	Strength	Begin	End	2020 - 2023
Wang CY, 2020, INT J ENV RES PUB HE, V17, P0, DOI 10.3390/ijerph17051729, DOI	2020	2.39	2020	2021	
Casero-Ripolles A, 2020, PROF INFORM, V29, P0, DOI 10.3145/epi.2020.mar.23, DOI	2020	1.99	2020	2021	
Larson HJ, 2020, NATURE, V580, P306, DOI 10.1038/d41586-020-00920-w, DOI	2020	1.79	2020	2020	
Huang CL, 2020, LANCET, V395, P497, DOI 10.1016/S0140-6736(20)30183-5, DOI	2020	1.79	2020	2020	
Chen Emily, 2020, JMIR PUBLIC HEALTH SURVEILL, V6, Pe19273, DOI 10.2196/19273, DOI	2020	1.59	2020	2021	
Tian HY, 2020, SCIENCE, V368, P638, DOI 10.1126/science.abb6105, DOI	2020	2.2	2021	2021	
Scheufele DA, 2019, P NATL ACAD SCI USA, V116, P7662, DOI 10.1073/pnas.1805871115, DOI	2019	1.99	2021	2021	
Pennycook G, 2019, P NATL ACAD SCI USA, V116, P2521, DOI 10.1073/pnas.1806781116, DOI	2019	1.49	2021	2021	
Shin J, 2017, NEW MEDIA SOC, V19, P1214, DOI 10.1177/1461444816634054, DOI	2017	1.49	2021	2021	
Wicke P, 2020, PLOS ONE, V15, P0, DOI 10.1371/journal.pone.0240010, DOI	2020	1.49	2021	2021	
[Anonymous], 2020, BBC, V0, P0	2020	1.49	2021	2021	
Maier BF, 2020, SCIENCE, V368, P742, DOI 10.1126/science.abb4557, DOI	2020	1.49	2021	2021	
Del Vicario M, 2016, P NATL ACAD SCI USA, V113, P554, DOI 10.1073/pnas.1517441113, DOI	2016	1.49	2021	2021	
Leung H, 2020, ADDICT BEHAV, V101, P0, DOI 10.1016/j.addbeh.2019.04.027, DOI	2020	1.49	2021	2021	
Pal A, 2019, COMPUT HUM BEHAV, V96, P110, DOI 10.1016/j.chb.2019.02.022, DOI	2019	1.49	2021	2021	
Sheikh Z, 2019, INFORM TECHNOL PEOPL, V32, P68, DOI 10.1108/ITP-04-2018-0195, DOI	2019	1.49	2021	2021	
Prentice C, 2020, J RETAIL CONSUM SERV, V57, P0, DOI 10.1016/j.jretconser.2020.102203, DOI	2020	1.49	2021	2021	
Zhao YX, 2020, J MED INTERNET RES, V22, P0, DOI 10.2196/18825, DOI	2020	1.96	2022	2023	
Li YR, 2020, AM REV PUBLIC ADM, V50, P698, DOI 10.1177/0275074020942105, DOI	2020	1.74	2022	2023	
Ngai CSB, 2020, J MED INTERNET RES, V22, P0, DOI 10.2196/21360, DOI	2020	1.52	2022	2023	

Figure 9. Citation burst of articles over time

7.2 Analysis of Evolution Trend

From the information analyzed above, we can see that the development of this field from 2020 to date can be broadly divided into three stages:

Phase 1: 2020-2021. "social media", "fake news", "content analysis", "disaster" are the key themes for media content research experts in this period. Focus was put on the role of social media in disseminating information about the COVID-19 pandemic in China and the management and prevention of disinformation about the pandemic. Phase II: 2021-2022. "support", "emotions", "media", "gratifications", "panic buying""flu" and "machine learning" are the frontiers of this phase of research by experts in this field. The main focus is on the media's support for the government's

release of information, the discussion of whether social media is more or less anxiety-inducing for the Chinese public, and the public's sense of engagement and fulfillment in social media communication. Phase 3: 2022-2023."Media satisfaction" and "media perception" are the most important concerns of scholars in this phase. The focus of the study shifts from the communicator's perspective to the audience's perspective, with more attention paid to the perceptions and feelings of Chinese audiences using social media during the pandemic.

8. Conclusion and Discussion

8.1 Conclusion

The purpose of this study is to sort out the development of content research on media reports related to the COVID-19 outbreak in China and present a knowledge map of this research. In this paper, we use bibliometric analysis to analyze the data sets collected from 2020 to 2023 for co-author analysis, same-country analysis, co-word analysis of authors and articles, same-word analysis, keyword clustering analysis, timeline and time zone analysis, and burst detection of keywords and articles.The database selected was the WoS/SSCI database. The software used was CiteSpace software (V6.2.R3). The quantitative and visual analysis of the dataset was used to identify the current state of development, hot research topics and research trends in the field. The main findings are presented below:

First, the annual publication trend of studies related to media coverage of the COVID-19 outbreak in China has shown an increasing trend from the very beginning and is growing rapidly. This indicates that research on this topic has been increasingly emphasized in the field of journalism and communication. The first article, "Applicable law to transnational personal data: trends and dynamics", was published in the German Law Journal in 2020. The starting phase begins with the risk of personal data breaches (Huang, 2020). Subsequent studies have centered on news credibility, and fake news. One of the main reasons fake news has been the focus of research is the widespread use of social media (Ruffo, Semeraro, Giachanou, & Rosso, 2021).An analysis of the publications shows that the three most influential publishers are "Communication", "Psychology Multidisciplinary" and "Public Environmental Occupational Health".

Secondly, the author analysis identified the best authors in the field, from Figure 2. Author collaboration network analysis, it can be found that most of the authors still chose to complete their research independently, except for a few authors such as Yao L.,Singh R. G., Ngai C.S. B. who chose to collaborate. Academic networking among scholars allows them to share different ideas, theoretical knowledge, concepts, etc. with each other, which helps to generate new ideas and knowledge and increase each other's productivity (Khalagi et al., 2021). However, not many studies in this field have been done collaboratively. And the collaborators are mostly colleagues or classmates. And there are no strong collaborative relationships between highly productive authors. The top 10 research organizations are all universities. This shows that universities are the main force in researching this field. Eight of the universities belong to China, indicating that Chinese universities are more willing to invest more human and financial resources to do research in this field, and they represent the research direction and core issues in this field.

Third, in terms of research hotspots, scholars are interested in “social media” “impact” “china” “communication” “information” “adoption” “participatio” “discourse”, etc. In addition, this aspect of social media spreading disinformation has been widely discussed. In addition to these findings, the evolutionary trend of the study was found to be divided into three phases, one for each year from 2020 to 2022. The first phase focuses on the study of social media dissemination of COVID-19 information, the second phase on the role of media, especially social media, in moderating mass emotions, etc., and the third phase on the perceptions and feelings of Chinese audiences using social media during the pandemic.

Fourth, in terms of research frontiers, "COVID-19 governance" emerged after the COVID-19 outbreak in 2020 and has continued to be a popular theme for scholars until this year (e.g., Thomas, Wilson, Tonkin, Miller, & Ward, 2020; Ngai, Singh, Lu, & Koon, 2020; Liu et al.,2021; Zhang Lin, & Jin, 2022; Gong Zanuddin, Hou, & Xu, 2022). In addition, "contesting coronavirus narrative" "understanding public protective behavioral intention " "chinese college student" "algorithmic awareness" " observational studies" have also been the focus of scholars. observational studies" has also been the concern of scholars.

In addition to these findings, the evolutionary trend of the study was found to be divided into three phases. 2020 to 2022, one phase per year. The first phase focuses on research on social media dissemination of COVID-19 information, the second phase on the role of media, especially social media, in moderating mass emotions, etc., and the third phase on the perceptions and feelings of Chinese audiences using social media during the pandemic.

These quantitative and visual knowledge graph analyses are useful in helping us to gain a comprehensive understanding of what content was covered by the media during COVID-19 in China. It can help us to have a comprehensive understanding of the knowledge structure in terms of media use and influence during the occurrence of COVID-19 in

China. (1) We analyzed the publication trends, and it is certain that media research on the content of China's COVID-19 has been a research theme in recent years. (2) We provided the most published authors, institutions, countries/regions, and collaborative networks, and further identified the most cited authors and articles and their clusters, discovering the most influential authors and institutions in research in our field. (3) We found the popular themes of research, discovered their clusters and their evolution on the timeline, and identified the frontiers of development of the field answer. (4) As the evolutionary development process of academic research in this field is revealed step by step, the direction of future research is clear.

8.2 Limitations and Future Research

Although this study is the earliest review of the literature in the field, it has some limitations. First, the bibliometric analysis has some limitations. The data for this study only included scholarly articles downloaded from the WoS/SSCI database from 2020 to August 6, 2023, so the results may be different if the data were replaced with articles from other databases (Ye, Kueh, Hou, Liu, & Yu, 2020). In addition, for the data collection in this study, search phrases were limited to "COVID-19 OR SARS-CoV-2 OR coronavirus OR corona virus" "media OR newspaper OR radio OR television" and "China", which ensured data concentration and avoided high contamination (Kajikawa, Ohno, Takeda, Matsushima, & Komiyama, 2007; Zhu and Hua 2017; Zemigala 2019). This also leads to the possibility that the data collected may be incomplete and not cover all the data (Li, Long, H. Chen, F. Chen, & Wang, 2020). In addition to the above two points, we use topics (including titles, abstracts, and keywords) as the scope of the search. Those that appear only in one of these sections, such as searching only in the article title or only in the abstract may show different results. These limitations can be correspondingly addressed in future research, such as expanding the database.

Although there is a slight flaw, this study's review of the literature and findings can provide some reference for future research. Although the COVID-19 pandemic will not last too long, the study of media content is still something that the field of journalism and communication needs to think about and study in the event of a similar disaster or crisis. In particular, what information is disseminated by social media? How to deal with the phenomenon of "fake information" and "fake news" in the media during a disaster or crisis? Whether the media's coverage of a disaster affects the image of the country needs to be further explored, which has also been a trend in recent years. Current research on media content in crises is scarce and fragmented, which poses a challenge for future research. In addition, the geographical concentration of publications is also uneven, which of course may have something to do with the fact that the target country of the study is set as China. Therefore, in the media content studies on COVID-19 in China, most of the studies were conducted in China, and the scholars of the studies were mostly Chinese scholars. Finally, the study of media content in crises can be a multilevel, multidisciplinary subject that can be studied from different perspectives. Therefore, collaborative research across disciplines, regions, cultures or institutions should be encouraged in order to discover and discuss more complete issues.

In conclusion, bibliometric analysis of the visualization and analysis of current hotspots and future frontiers can not only accurately demonstrate the academic development of the field, but also help to discover the knowledge base and future research directions in the field.

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Authors contributions

Dr. Diyana Nawar Kasimon and Dr. Wan Anita Wan Abas were responsible for study design and revising. PhD candidate Hu Xiaolin was responsible for data collection. PhD candidate Hu Xiaolin drafted the manuscript and revised it. All authors read and approved the final manuscript.

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Data sharing statement

No additional data are available.

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