International Journal of Knowledge Processing Studies
(KPS)

ORIGINAL RESEARCH ARTICLE

The Impact of -Covid on Thematic Trends in Humanities and Social Sciences: A Scientometric Analysis of European, Asian, and American Continental Studies

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ARTICLE INFO

ABSTRACT

The purpose of this study is to identify the thematic trends of scientific publications in the fields of humanities and social sciences, considering the impact of Covid-19. The study utilizes a descriptive approach with a scientometric and content analysis method, incorporating co-word analysis and social network analysis techniques. The research population comprises Covid-19 studies in the fields of humanities and social sciences in the Web of Science, conducted between 2019 and 2021, involving the top countries in three prominent continents. CiteSpace, Bibexcel, and Gephi software were used to analyze the data, while VOSviewer software was utilized to visualize the intellectual structure. The analysis reveals that religion, spirituality, public health, religiosity, mental health, epidemics, depression, crisis, social media, anxiety, and ethics are significant keywords in research within the humanities and social sciences. Additionally, thematic overlap is observed in the clusters of "China and Spain" and "India, Turkey, Britain, Italy, United States, Canada, and Brazil," with a greater accumulation of clusters in the studies of Turkey, Canada, and Brazil. In addition, it can be said that the focus of studies in the Americas is more on social sciences than on studies in the other two continents. ©authors

1. Introduction

Most of the studies of Covid-19 started in research fields such as biological sciences, virology, clinical, medicine, pharmacy, and topics such as symptoms of the virus, diagnosis, effective drugs, transmission and ways to prevent this virus, vaccination, different types of viruses, etc. (Haleem et al., 2020; Riccaboni, & Verginer, 2022; Rashid, & Yadav, 2020) gradually with the spread of this virus and its serious consequences in all dimensions of human life attracted the attention of researchers in non-medical fields such as humanities and social sciences; researchers in these fields have also designed, conducted and published studies in order to work with researchers in other fields to deal with this global crisis and its effects and consequences on various aspects of human life. undoubtedly, the fields of research and technology are witnessing the emergence of interdisciplinary fields and new research fronts that can determine the direction of future developments in science and technology. The humanities and social sciences have been pivotal in assessing Covid-19's impact on societies. Some studies have delved into identifying and analyzing the knowledge network concerning Covid-19's scientific output within these fields, highlighting their crucial role during times of pandemic crises (Baratlo, 2023; Roychowdhury, et al., 2022).

The humanities today come from Classical Greek paideia, an educational system from the 5th century BCE to prepare men for citizenship. The term "studia humanitatis" emerged in the 15th century to refer to secular literary and scholarly pursuits.As the humanities expanded in the 19th century, their identity shifted from separation from the divine to exclusion of the material and methods of the advancing physical sciences. The physical sciences approached the world and its phenomena objectively, without consideration for human meaning and purpose. Proponents of the humanities continue to debate whether emphasis should be placed on the subject matter or the methods in accomplishing this distinction. In the late 19th century, the German philosopher Wilhelm Dilthey referred to the humanities as "the spiritual sciences" and "the human sciences," describing them as areas of knowledge that lie outside and beyond the subject matter of the physical sciences. Conversely, Heinrich Rickert, an early 20th-century Neo-Kantian, argued that it is the method of investigation that best characterizes the humanities. Rickert contended that while the physical sciences aim to derive general laws from particular instances, the human sciences are "idiographic," devoted to the unique value of the particular within its cultural and human contexts and not seeking general laws (Britannica, 2023). The humanities include philosophical sciences, political sciences, educational sciences, psychological sciences, legal sciences, historical sciences, management sciences, linguistics, literary sciences, social sciences, economics, geographical sciences, theology, and art (Mohammadi, & Thelwall, 2014). Humanities encapsulate human experiences, fostering connections among individuals, enhancing self-awareness and empathy, and influencing the future (Gifford & Nilsson, 2014). Social sciences, which emerged in the nineteenth century, include academic specialties related to society and its individuals. These sciences encompass anthropology, archeology, communication studies, economics, history, social studies, musicology, human geography, law, linguistics, political science, psychology, public health, and sociology, among others (Thomas, 2011). The field of humanities amd social sciences actively influences all areas of science and research. They identify the social, cultural, and biological aspects of human life and contribute to understanding human experience (Cross, 2006).

Research on Covid-19 has focused on psychology, business economics, health care services, educational research, ecology, environmental sciences, technology, public environment, occupational health, biomedical social sciences, government law, social work, sociology, medical ethics, psychiatry, development studies, international relations, women studies, public administration, family

studies, communication, geography, and urban studies (Roychowdhury, et al., 2022).

Studying the intellectual landscape of knowledge and the evolution of various fields is a crucial research objective. Scientific domain assessments often employ techniques such as citation analysis and co-word analysis. The latter involves using document keywords to explore the conceptual structure of a field. By examining the co-occurrence of keywords, cognitive relationships between documents are revealed, exposing connections between ideas. Metrics like closeness and similarity gauge the connections between items. These metrics help to group and interconnect concepts, shedding light on pivotal themes and concealed associations within a domain (Börner, Chen, & Boyack, 2003).

Social network analysis methods can be applied to interpret scientific maps. Freeman's centrality metrics, encompassing degree, closeness, and betweenness centrality, are valuable for analyzing social networks. Centrality metrics illustrate the type and quantity of relationships a network member holds with others within that network (Cuellar et al., 2016). Nodes with high betweenness centrality occupy privileged positions, acting as brokers or gatekeepers for connecting nodes and groups, and serve as indicators of direct and indirect control over information flow within the network. Furthermore, the value of betweenness centrality always falls between zero and one. A zero value suggests that removing the node has no significant impact on the network, while a value of one indicates a strategically positioned node. In the latter case, the node itself becomes a potential turning point, holding a unique position (Hansen, et al., 2010; Abbasi, Hussein and Leedsdorf, 2012).

Numerous studies have employed scientometric and bibliometric techniques, with some focusing on specific subject areas. For instance, researchers have examined highly-cited papers within fields such as Library Science (Bauer et al., 2016) and Mobile Learning (Lai, 2020). Other studies have evaluated scientific journals and the works of particular authors, such as those by Moradi et al. (2023) on the International

Journal of Sport Policy and Politics, and Donthu (2020) on the Journal of Business Research. Additionally, Nawaz (2023) explored the legacy and scientific impact of Professor Saeed-Ul Hassan, while Noruzi et al. (2023) reviewed the scientific articles of Professor Henri Dou from a scientometric perspective. Scientific misconduct has also been a subject of inquiry, as evidenced by works like those of Bar-Ilan & Halevi (2018) on the characteristics of retracted articles, Elango (2021) on retracted articles in the biomedical field of India.

Co-word analysis, a common method in scientific assessment studies, unveils thematic clusters within a research field (e.g., Covid-19), examines its conceptual and semantic relationships, and delineates the intellectual structure of knowledge within the field. This approach is invaluable for researchers interested in the field, especially given the widespread research related to the Covid-19 epidemic and the subsequent global changes across various human, cultural, social, political, and economic dimensions. Moreover, within the realm of coronavirus and Covid-19, numerous scientometric and altmetric studies have been conducted (Okolie & Ogundeji, 2022; Liu, et al., 2022; Roychowdhury & Biswas, 2022; Cunningham, Smyth, & Greene, 2021; Baratlou, 2021; Gul et al., 2020; Edakar & Shehata, 2022; Urru et al., 2022; Haseli et al., 2022; Mihaela et al., 2020; Zhai et al., 2020; Mao, Guo, & Xiang, 2020; Khuluq, et al., 2022; Oliveira et al., 2021; Al-Emran & Arpaci, 2022).

For example, Shaukat et al. (2020) investigated the impact of Covid and Sars in the social sciences from 2003 to 2020, highlighting the wide-ranging influence of these diseases on individuals and the importance of relevant studies and analysis in this field. Roychowdhury et al. (2022), through bibliometric analysis of COVID-19 research in the social sciences from 2020 to mid-2021, illustrated the global scope of Covid-19 research. They emphasized the significant impact of COVID-19 on the least developed and developing countries, especially in the social and economic domains. Furthermore, they observed that

developed nations have prioritized the social, economic, and psychological effects of the pandemic and have been actively publishing papers on the social aspects of COVID-19. Their research underscores the crucial role of research and institutions in advancing human development and sustainability. Shapira (2020) provided an overview of scientific research trends during the Covid-19 pandemic, revealing a substantial volume of research not only in medicine and public health but also in social sciences, arts, and humanities.

Overall, various scientometric and metascientific studies on Covid-19, including co-occurrence analysis of words and social network analysis, are increasing (Roychowdhury, et al., 2022). This study aims to identify, analyze, and compare thematic trends of Covid-19 scientific productions across three leading continents, addressing key question through co-word analysis and will answer the following question:

1. Which social science topics have been the focus of research related to Covid-19 in the top 9 countries on three continents? In other words, what are the key terms that humanities and social sciences studies are focused on in the three leading continents?

2. What thematic clusters have emerged in the studies of science production in nine countries across three continents through co-word analysis?

3. What is the co-occurrence distribution of keywords in the field of Covid-19 related to humanities and social sciences, based on degree, closeness, and betweenness centrality indicators in the studies of science production in nine top countries across three leading continents?

2. Method

The ongoing applied research is a descriptive study conducted using a scientometric approach, employing content analysis, co-word analysis, and social network analysis. The study centers on the scientific output of the top three countries in the three leading continents of Europe, Asia, and the Americas concerning Covid-19 studies in the fields of humanities and social sciences. Data was gathered from the Web of Science database spanning 2019 to 2021. The Web of Science is known for its strict journal evaluation and accurate data.

The selection of countries is based on their production in this research area. Relevant records were obtained using medical thesaurus, subject headings, and specialist opinions to identify various compounds and names associated with Covid-19 disease. Scientific publications related to the subject area were searched and retrieved from the Web of Science core collection using the specified search strategy below.

(TS="COVID-19") OR (TS="coronavirus disease 2019") OR (TS="novel coronavirus") OR (TS="2019 ncov") OR (TS="coronavirus 2019") OR (TS="new coronavirus") OR (TS="sars-cov 2") OR (TS="nCoV-19")

In the analysis results section, research areas in the humanities and social sciences were chosen based on the classification of "research areas", and scientific output in these areas was gathered. Scientific productions involving researchers from top countries of leading continents were retrieved using the classification of "countries". After integrating the relevant records, the data were analyzed using CiteSpace, bibExcel, and Gephi software, based on the research's purpose and questions. VOSViewer software was used to draw the intellectual structure and analyze the topics.

3.Findings

In the field of Covid-19, a total of 108160 studies have been indexed in the Web of Science database until April 12, 2021. After limiting the retrieved results to the fields of humanities and social sciences, 15,616 studies were identified in these fields. The United States leads with 4,635 studies from the Americas, followed by England with 1794 studies, China with 1282 studies, Italy with 906 studies, Canada with 838 studies, Spain with 760 studies, India with 661 studies, Brazil with 581 studies, and Turkey with 250

studies. Based on the above, the United States, Canada, and Brazil are the leading countries in the Americas; England, Italy, and Spain are the leading countries of Europe; and China, India, and Turkey are the leading countries in Asia.

The diagram below illustrates a three-field layout for analyzing thematic trends in COVID-19-related humanities and social science research, focusing on the relationships between countries, keywords, and authors. The rectangles represent the three entities, with their height indicating the amount of research conducted by countries, research fields, and authors. The size and height of the rectangles correspond to the volume of research conducted by each entity. Additionally, the lines of communication depict the connections established between authors and countries, with the thickness of the links increasing as the volume of research grows (Noruzi et al.,2022).
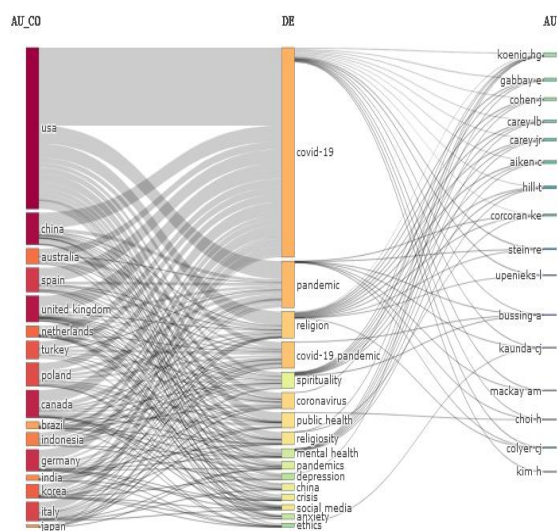

Fig 1. Three-field plot for the relationships among countries, author keywords, and authors in the Thematic trends of Covid-19 in humanities and social sciences research. (Au_CO: Author country, DE: Document keyword, AU: Author).

The triple analysis of Corona literature in humanities and social sciences research in continental studies (figure 1) reveals that six countries from Asia and six countries from Europe, three countries from America, and one country from Oceania have produced the most content. However, African countries were not among the leading countries in the continental comparison. In this way, during

the period under review, the most scientific content production has been done in the three continents of Asia, Europe and America. Also, the United States conducted the most research in this area. The size and height of the rectangle of the countries express this difference. in addition, this analysis shows that religion, spirituality, public health, religiosity, mental health, epidemics, depression, crisis, social media, anxiety, ethics are the important keywords that humanities and social science research in continental studies focused on. Also, most of these studies were conducted by researchers whose names are displayed in the last column of the figure above.

After entering all the records extracted from the Web of Science into the VOS Viewer software, the co-occurrence network of Covid-19 studies in major countries across three continents was analyzed, producing the following results:

A. The Asia: After analyzing the keywords of Covid-19 scientific research related to China, India, and Turkey, which are prominent nations in Asia, thematic concepts and clusters were identified. Figure 1 below shows a map of Covid-19 research in China. Co-word analysis identified seven clusters of keywords and concepts, with node size indicating frequency of use and color representing the cluster. The distance and proximity of the keywords in this map indicate the level of relatedness between the concepts.
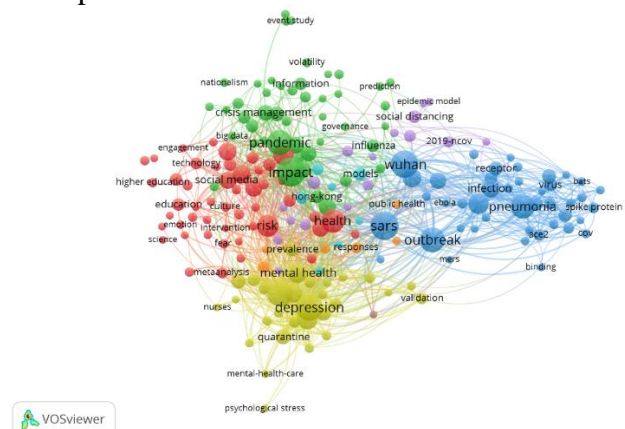

Fig 2. Co-occurrence Map of Chinese Studies Keywords

In the following, Table 1 shows the clusters with occurrence (with a minimum occurrence of 20), number of links, total link strength and average normalized citations of each topic.

Table 1. Clusters and topics of Chinese studies

label	cluster	weight<Links>	weight<Total link strength>	weight<Occurrences>	Score<Avg. norm. citations>
anxiety	4	83	203	47	0.7414
depression	4	75	212	51	0.7387
mental health	4	53	90	26	1.0748
mental-health	4	54	99	21	0.6719
stress	4	74	171	32	1.2265
acute respiratory syndrome	3	52	94	29	2.0821
disease	3	44	63	25	1.9465
infection	3	49	81	23	1.7409
outbreak	3	79	171	46	1.4247
pneumonia	3	45	115	42	2.1044
sars	3	87	193	57	4.21
sars-cov	3	25	48	13	1.41
transmission	3	45	63	20	3.1136
wuhan	3	69	130	54	1.334
covid&#8208	2	31	33	20	0.231
epidemic	2	53	84	22	0.3932
impact	2	110	220	61	0.9235
pandemic	2	56	77	44	0.8249
health	1	76	124	40	2.0216
management	1	42	56	24	0.6324
model	1	57	75	30	1.2858
performance	1	46	65	23	3.5819
resilience	1	48	64	22	0.8978
risk	1	70	122	35	0.6097
social media	1	52	70	21	1.0656

Using the communication and social network data obtained from the keywords via VOS Viewer software, the next step involved analyzing the keywords of Chinese studies using centrality metrics in Gephi software (Table 2).

Table 2. Top 5 Keywords Chinese Studies Based on Centrality Criteria

Keyword	degree Centrality	Keyword	closeness Centrality	Keyword	Betweenness centrality
China	26	China	0.65	China	56.56
Epidemic	18	Epidemic	0.6	Epidemic	11.7
Resilience	14	Resilience	0.57	Wuhan	6.78
Hong Kong	12	Hong Kong	0.56	Holiday	5.64
well-being	10	well-being	0.55	Crisis	5.16

According to Table 2 China, epidemics and resilience have the highest degree and closeness centrality. China, the epidemic, and Wuhan are at the center of the map, as shown in Figure 1, and have the most betweenness centrality. The following figure 2 shows the

concept map of Covid-19 studies related to India. The co-word analysis of the studies of this country led to the formation of 7 clusters of keywords and concepts.
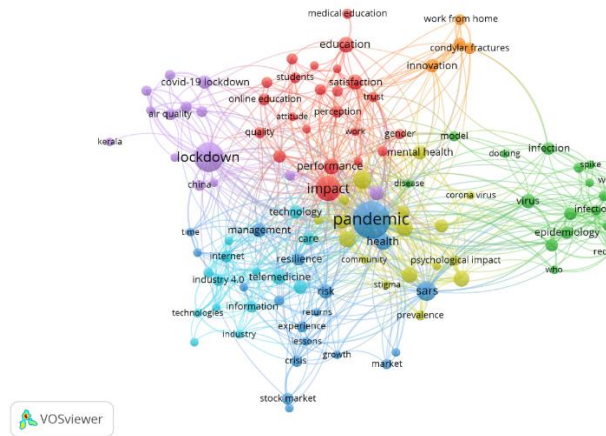
Fig3. Co-occurrence Map of Indian Studies keywords

In the following, Table 3 shows the clusters along with the occurrence (with a minimum occurrence of 10), the number of links, the total link strength and the average of normalized citations of each topic.

Table 3. Clusters and topics of Indian studies

label	cluster	weight<Links>	weight<Total link strength>	weight<Occurrences>	Score<Avg. norm. citations>
anxiety	4	29	51	13	0.7767
depression	4	26	50	13	3.4401
education	1	13	17	12	0.752
epidemic	4	20	25	12	0.2293
health	3	17	23	14	2.2456
impact	1	53	88	32	1.3879
lockdown	5	35	63	43	1.2632
management	3	20	25	10	6.3328
mental health	4	20	30	10	0.3819
outbreak	4	29	37	12	4.3016
pandemic	3	73	131	70	1.6396
performance	1	20	25	12	1.3359
public health	5	16	19	10	4.3307
risk	3	22	24	10	2.3161
sars	3	37	51	19	1.9239
satisfaction	1	22	28	11	3.0945
stress	4	26	50	16	0.898
telemedicine	6	12	17	10	0.7693
virus	2	21	28	10	1.0947

Using the communication and social network data obtained from the keywords via VOS Viewer software, the next step involved analyzing the keywords of Indian studies using centrality metrics in Gephi software (Table 4).

Table 4. *Top 5 Keywords Indian Studies Based on Centrality Criteria*

Keyword	degree Centrality	Keyword	closeness Centrality	Keyword	Betweenness centrality
India	24	India	0.65	India	**81.45**
Holiday	18	Holiday	0.59	Holiday	**15.59**
Social distancing	10	Social distancing	0.53	Air quality	**6.44**
Air quality	8	Air quality	0.52	Social distancing	**1**
e-learning	6	e-learning	0.5	e-learning	**0.8**

According to Table 4 in India, holidays and social distance have the highest degree and closeness centrality. India, holidays and air quality, as shown in Figure 3, are at the center of the map and have the most betweenness centrality. The following figure 3 shows the concept map of Covid-19 studies related to Turkey. Following the co-word analysis of studies in this field, 10 clusters of keywords and concepts were identified.
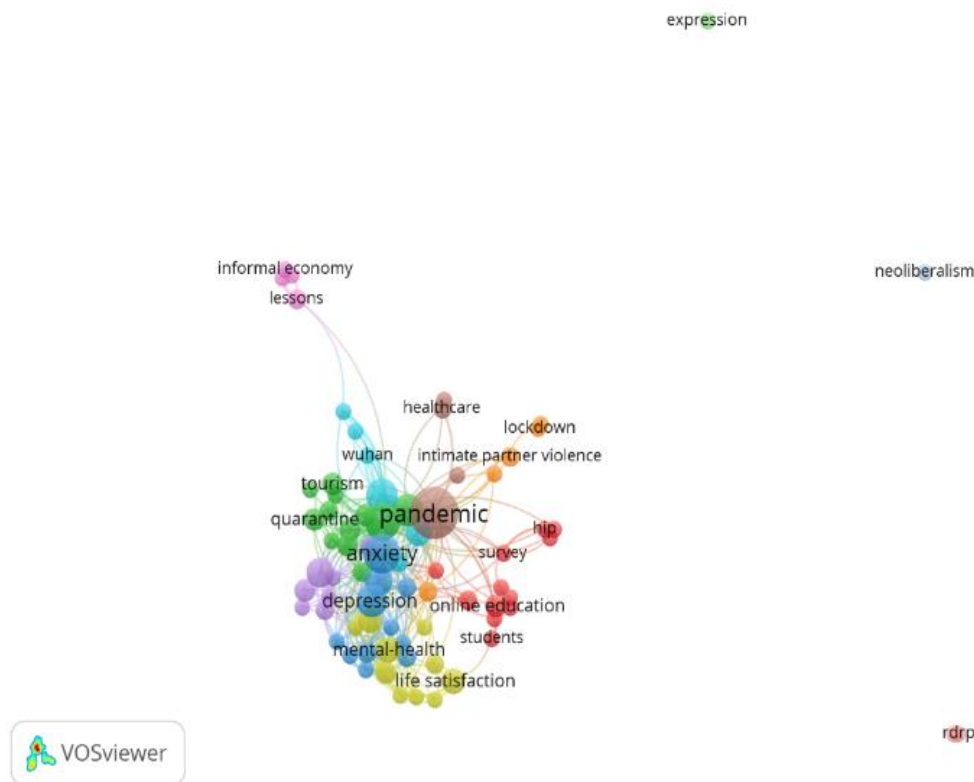
Fig 4. Co-occurrence Map of Turkish Studies keywords

The following is a table of 5 clusters with occurrence (minimum occurrence 5), number of links, total link strength, and average of normalized citations for each topic.

Table 5. *Clusters and topics of Turkish studies*

label	cluster	weight<Links>	weight<Total link strength>	weight<Occurrences>	Score<Avg. norm. citations>

pandemic	8	29	37	25	0.3496
china	6	16	21	11	2.5074
risk	6	14	18	7	0.0937
distance education	5	5	5	5	0.2017
performance	5	13	15	8	0.3278
life satisfaction	4	7	9	6	0.2336
mental-health	4	17	18	6	1.8824
resilience	4	17	22	5	6.8395
stress	4	18	23	6	0.2336
anxiety	3	32	41	15	0.9799
depression	3	26	36	10	1.3032
health	3	20	25	8	1.6147
crisis	2	13	15	5	0.4213
impact	2	31	39	14	0.9122
quarantine	2	9	9	5	0.159
sars	2	22	28	10	1.7965
tourism	2	7	9	5	0.159
online education	1	7	7	5	0.1967

Using the communication and social network data obtained from the keywords via VOS Viewer software, the next step involved analyzing the keywords of Turkish studies using centrality metrics in Gephi software (Table 6).

Table 6. *Top five keywords of Turkish studies based on centrality metrics*

Keyword	degree Centrality	Keyword	closeness Centrality	Keyword	Betweenness centrality
Survey	24	Survey	0.5	Life satisfaction	182.02
Turkey	18	Life satisfaction	0.5	Survey	91.66
Life satisfaction	10	Turkey	0.5	Hope	78
e-learning	8	e-learning	0.48	Quarantine	60.16
Informal economy	6	Informal economy	0.47	Turkey	40.81

According to Table 6 of the survey, Turkey and life satisfaction have the highest degree and closeness centrality. Life satisfaction, Survey and hope, as shown in Figure 3, are at the center of the map and have the most betweenness centrality.

B. The Europe: After analyzing the keywords of Covid-19 scientific research related to England, Italy and Spain which are prominent countries in Europe, thematic concepts and clusters were identified. The following figure 4 shows a map of the concepts of Covid-19 studies related to England. Following the co-word analysis of studies in this field, 8 clusters of keywords and concepts were identified.
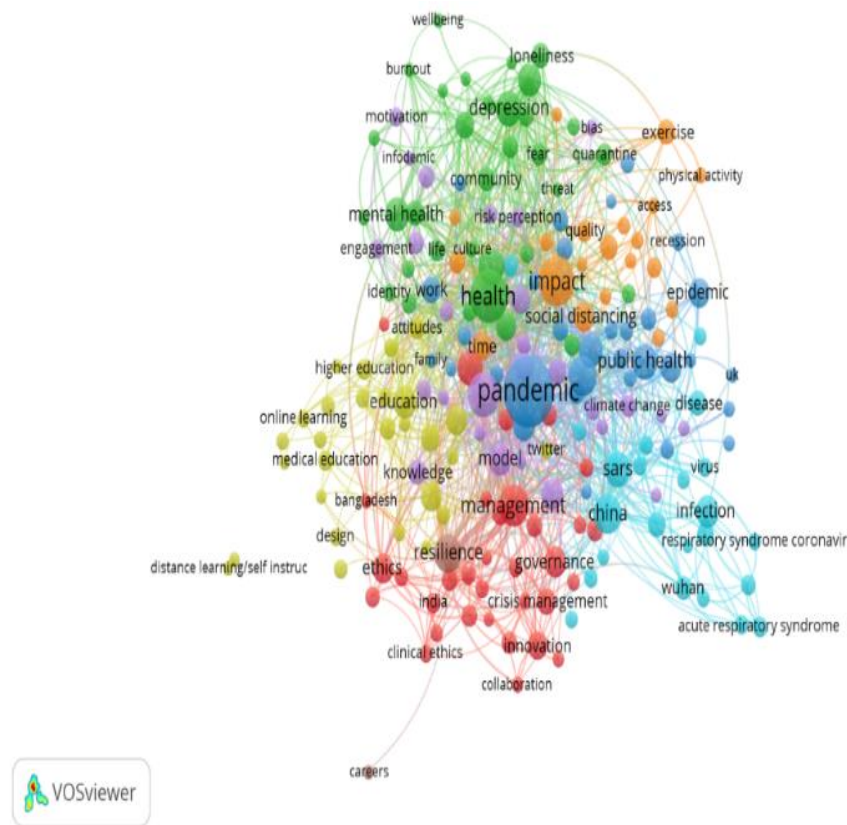
Fig5. Co-occurrence Map of British Studies keywords

The following is a table of 7 clusters with occurrence (with a minimum occurrence of20), number of links, total link strength and number of normalized citations for each topic.

Table 7. *Clusters and topics of British studies*

label	cluster	weight<Links>	weight<Total link strength>	weight<Occurrences>	Score<Avg. norm. citations>
resilience	8	70	115	35	1.9398
impact	7	104	192	63	2.218
social distancing	7	31	32	22	0.3193
china	6	51	77	40	1.6659
infection	6	34	49	26	1.8429
sars	6	70	111	32	2.7775
model	5	50	70	26	3.1245
policy	5	48	63	24	0.9541
risk	5	78	127	47	0.6549
uncertainty	5	32	39	20	1.1199
education	4	45	57	26	1.0657
social media	4	45	70	21	0.8652
technology	4	44	55	22	1.3246
care	3	53	74	24	0.8222
crisis	3	85	123	38	1.1899
epidemic	3	33	45	21	0.7815
gender	3	51	74	28	0.5367
inequality	3	40	51	21	0.7046
anxiety	2	45	83	26	0.8519
behavior	2	57	83	20	1.22
depression	2	56	121	32	1.3469

health	2	106	210	69	3.0687
lockdown	2	35	51	34	0.9808
mental health	2	43	71	28	0.3062
ethics	1	20	41	21	0.5186
governance	1	25	36	23	0.3482
innovation	1	28	40	20	0.2788
management	1	78	136	41	1.4426
performance	1	69	97	32	1.324

Using the communication and social network data obtained from the keywords via VOS Viewer software, the next step involved analyzing the keywords of British studies using centrality metrics in Gephi software (Table 8).

Table 8. Top 5 Keywords British Studies Based on Centrality Criteria

Keyword	degree Centrality	Keyword	closeness Centrality	Keyword	Betweenness centrality
Crisis	38	Crisis	0.53	Motivation	416
Quarantine	34	Technology	0.53	India	212.7
Education	32	Quarantine	0.52	Ethics	191.67
Technology	32	Education	0.52	Quarantine	100.01
Holiday	30	Government	0.52	children	95.68

According to Table 8 crisis, quarantine and education have the highest degree of centrality. Crisis, technology and quarantine have the highest degree and closeness centrality, respectively. Motivation, India, and ethics, as shown in Figure 4, are at the center of the map and have the most betweenness centrality. The following figure 5 shows the concept map of Covid-19 studies related to Italy. Based on the studies of this country, 7 clusters of keywords and concepts were identified using morphological analysis
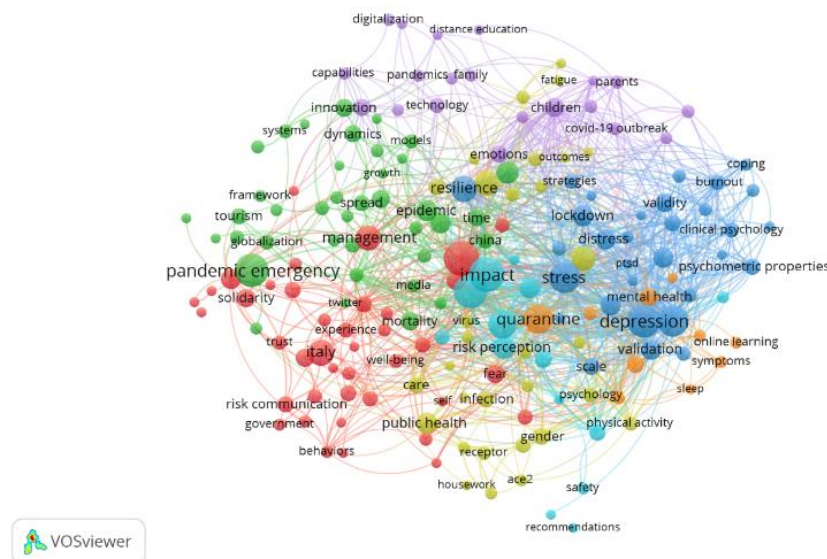
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Figure 5. Co-occurrence Map of Italian Studies keywords

The following is a table of 9 clusters with occurrence (with a minimum occurrence of 15), number of links, total link strength and number of normalized citations for each topic.

Table 9. Clusters and topics of Italian studies

label	cluster	weight<Links>	weight<Total link strength>	weight<Occurrences>	Score<Avg. norm. citations>
quarantine	7	77	162	30	1.8114
health	6	84	148	39	0.845
impact	6	100	170	43	1.5916
risk perception	6	46	66	19	0.6274
sars	6	66	132	28	0.579
exercise	4	50	76	20	2.8133
performance	4	60	89	23	2.5555
public health	4	30	47	16	2.3777
anxiety	3	74	173	34	0.6688
depression	3	86	224	38	1.5058
lockdown	3	41	60	16	1.0896
resilience	3	65	110	25	0.674
stress	3	86	177	34	0.7667
epidemic	2	35	48	16	0.1869
model	2	47	58	17	1.8591
pandemic emergency	2	13	18	40	0.0249
risk	2	47	55	15	1.8139
italy	1	26	30	24	0.7748
management	1	57	71	22	1.1813
pandemic	1	79	122	43	1.169

Using the communication and social network data obtained from the keywords via VOS Viewer software, the next step involved analyzing the keywords of Italian studies using centrality metrics in Gephi software (Table 10).

Table 10. Top five keywords of Italian studies based on centrality metrics

Keyword	degree Centrality	Keyword	closeness Centrality	Keyword	Betweenness centrality
Quarantine	30	Quarantine	0.64	Quarantine	28.03
Holiday	26	Holiday	0.62	Resilience	22.85
Risk Perception	22	Risk Perception	0.6	Holiday	16.39
Resilience	22	Resilience	0.6	Italy	11.7
Health	16	Health	0.56	Risk Perception	10.89

According to Table 10 quarantine, holiday and risk Perception have the highest degree and closeness centrality. quarantine, resilience and holiday, as shown in Figure 4, are at the center of the map and have the most betweenness centrality. The following figure 6 shows a map of the concepts of Covid-19 studies related to Spain. Following the co-word analysis of the studies of this country, 7

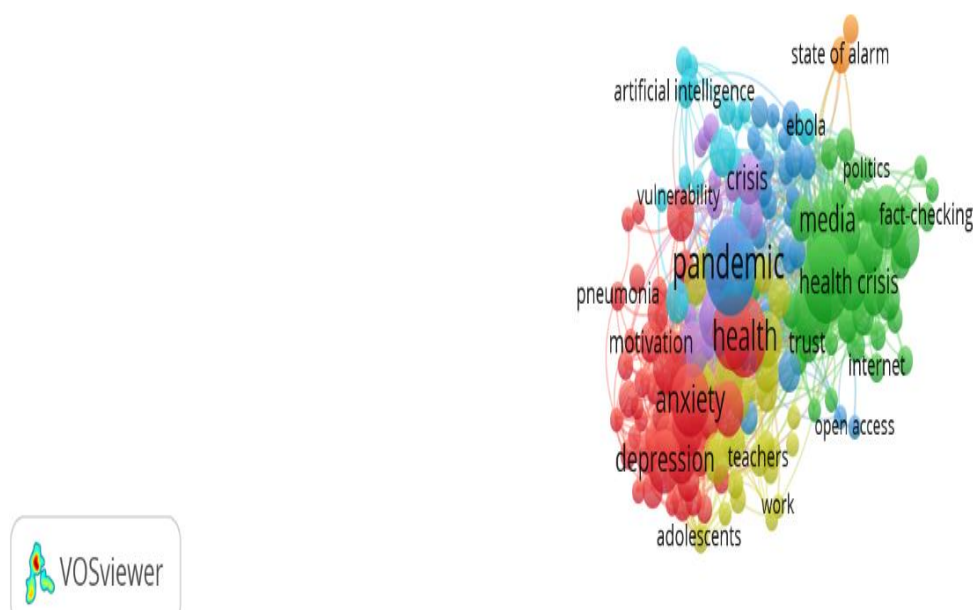clusters of keywords and concepts were identified.

Fig6. *Co-occurrence Map of Spanish Studies keywords*

The following is a table of 11 clusters with co-occurrence (with a minimum co-occurrence of20), number of links, total link strength, and average of normalized citations for each topic.

Table 11. Clusters and topics of Spanish studies

label	cluster	weight<Links>	weight<Total link strength>	weight<Occurrences>	Score<Avg. norm. citations>
performance	5	50	76	20	1.2199
pandemic	3	79	121	56	1.0648
communication	2	70	141	29	0.575
fake news	2	42	114	23	1.5507
information	2	56	105	20	1.3971
media	2	58	126	24	0.672
pandemics	2	86	208	44	1.2262
social media	2	74	183	31	2.0565
anxiety	1	63	135	31	1.9838
depression	1	55	112	23	3.4845
health	1	89	161	40	0.9111
impact	1	80	136	34	2.1429
lockdown	1	60	94	24	2.7743
quarantine	1	43	90	20	2.5639
stress	1	49	107	20	2.3102

Based on the communication and social network obtained between the keywords through VOS Viewer software, the keywords of Spanish studies were analyzed based on centrality metrics (Table 12).

Table 12. Top five keywords of Spanish studies based on centrality metrics

Keyword	degree Centrality	Keyword	closeness Centrality	Keyword	Betweenness centrality
Spain	84	Spain	0.62	Spain	772.94
Fake news	50	Fake news	0.55	education	186.14
twitter	50	twitter	0.55	Holiday	124.28
Crisis Communications	44	Holiday	0.55	Fake news	122.98
Holiday	40	Crisis Communications	0.54	Higher Education	111.65

According to Table 12 Spain, fake news and Twitter have the highest degree and closeness centrality. Spain, education and Holiday, as shown in Figure 6, are at the center of the map and have the most betweenness center.

C. The Americas: After analyzing the keywords of Covid-19 scientific research related to United States, Canada and Brazil, which are prominent nations in the Americas, thematic concepts and clusters were identified. Figure 7 below shows a map of the concepts of Covid-19 studies in the United States. The co-word analysis of the studies of this country led to the formation of 6 clusters of keywords and concepts.
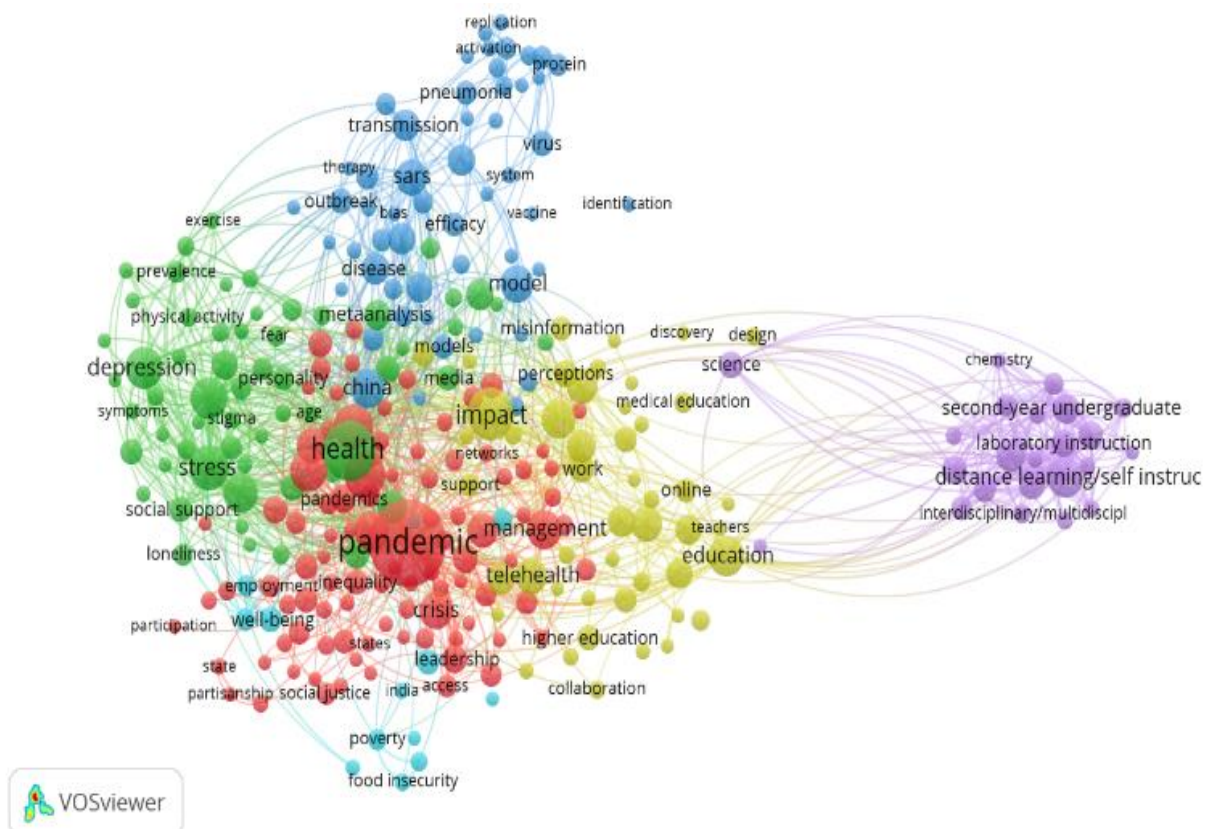
Fig 8. Co-occurrence Map of US Studies keywords

The following is a table of 13 clusters with occurrence (with a minimum occurrence of 40), number of links, Total link strength and average of normalized citations for each topic.

Table 13. Clusters and Topics of US Studies

label	cluster	weight<Links>	weight<Total link strength>	weight<Occurrences>	Score<Avg. norm. citations>
distance learning/self-instruction	5	42	343	72	0.1658
first-year undergraduate/general	5	38	226	49	0.1372
second-year undergraduate	5	36	206	40	0.1229
communication	4	76	140	46	0.8049
distance learning	4	44	88	40	0.5433
education	4	90	199	71	0.2154
impact	4	170	380	116	1.2019
online learning	4	47	97	52	0.2177
performance	4	115	179	50	0.6942
social media	4	96	165	67	1.418
technology	4	74	126	45	0.567
telehealth	4	57	102	57	0.9152
telemedicine	4	47	83	45	1.5345
china	3	83	158	67	3.337
disease	3	75	112	44	4.1267
epidemic	3	45	82	41	3.5278
infection	3	54	91	44	3.7362
influenza	3	76	127	43	2.4825
model	3	98	164	59	2.7494
sars	3	83	176	55	5.3949
transmission	3	35	68	44	4.831
anxiety	2	104	267	75	0.7778
depression	2	96	290	76	0.8765
health	2	177	451	150	0.8476
mental health	2	109	229	66	0.8287
outcomes	2	96	138	44	0.6302
quarantine	2	79	144	40	1.4967
resilience	2	73	114	48	0.3583
stress	2	120	339	87	0.4668
care	1	103	179	67	0.3742
crisis	1	86	149	59	1.231
gender	1	72	109	51	1.709
management	1	99	186	63	0.759
pandemic	1	202	603	318	0.8621
policy	1	73	107	52	0.4562
public health	1	100	181	90	1.0747
risk	1	129	247	86	1.0499
social distancing	1	86	127	77	0.7839

Using the communication and social network data obtained from the keywords via VOS Viewer software, the next step involved analyzing the keywords of United States studies using centrality metrics in Gephi software (Table 14)

Table 14. Top Five Keywords United States Studies Based on Centrality Criteria

Keyword	degree Centrality	Keyword	closeness Centrality	Keyword	Betweenness centrality
Distance Learning	36	Distance Learning	0.64	Distance Learning	282.77
Social distancing	30	Education	0.57	education plan	109.04
Education	30	Politics	0.57	Politics	79.05
Technology	26	Ethics	0.56	Ethics	66.97
e-learning	24	Technology	0.56	Professional development	39.82

According to Table 14 distance learning, social distance and education have the highest degree centrality. Distance education, education and politics have the highest closeness centrality, respectively. Distance education, curriculum and politics are at the center of the map, as shown in Figure 7, and have the most betweenness centrality. Figure 8 below shows a map of the concepts of Covid-19 studies of Canada. Following the co-word analysis of the studies of this country, 10 clusters including keywords and concepts were formed.

Fig 9. Co-occurrence Map of Canadian Studies keywords
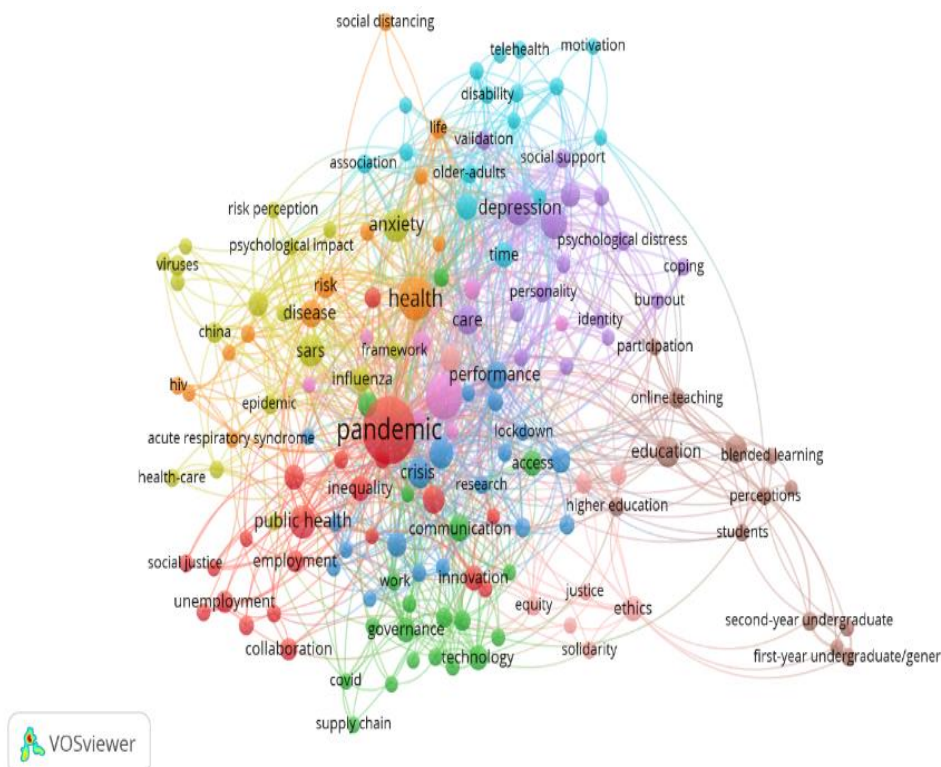
The following is a table of 15 clusters with occurrence (with a minimum occurrence of 10), number of links, total link strength and average of normalized citations for each topic.

Table 15. Clusters and Topics of Canadian Studies

label	cluster	weight<Links>	weight<Total link strength>	weight<Occurrences>	Score<Avg. norm. citations>
ethics	10	14	17	10	0.196
mortality	10	27	37	11	5.7795
impact	9	60	87	31	0.9403
education	8	25	33	14	0.4238
online learning	8	9	12	12	0.3375
disease	7	19	21	12	2.3079
health	7	54	74	29	2.0586
risk	7	22	26	10	1.135
quarantine	6	27	34	11	1.5085
time	6	18	20	10	5.7545
care	5	25	27	13	0.2936
depression	5	36	64	18	1.2438
mental health	5	19	23	10	1.3781
stress	5	44	69	16	1.5614
anxiety	4	31	42	16	0.95
sars	4	34	45	15	1.8448
crisis	3	28	33	14	3.8658
performance	3	30	31	12	1.9247
resilience	3	39	48	14	4.1517
communication	2	21	27	11	1.4726
technology	2	16	19	10	0.7878
gender	1	21	26	12	0.6803
innovation	1	11	13	10	0.6956
pandemic	1	73	121	67	1.6147
public health	1	27	30	17	1.3567

Using the communication and social network data obtained from the keywords via VOS Viewer software, the next step involved analyzing the keywords of Canadian studies using centrality metrics in Gephi software (Table 15).

Table 16. Top Five Keywords Canadian Studies Based on Centrality Criteria

Keyword	degree Centrality	Keyword	closeness Centrality	Keyword	Betweenness centrality
Canada	16	Canada	0.55	Stability	**67.61**
Crisis	16	Crisis	0.55	Canada	**36.78**
Unemployment	14	Unemployment	0.54	Unemployment	**10.16**
Inequality	12	Inequality	0.54	e-learning	**10.02**
Higher Education	10	leisure	0.52	Higher Education	**9.16**

According to Table 16 Canada, crisis and unemployment have the highest degree and closeness centrality. Sustainability, Canada and unemployment, as shown in Figure 8, are at the center of the map and have the most Betweenness centrality. Figure 9 below shows a map of the concepts of Covid-19 studies in Brazil. Based on the co-word analysis of studies in this field, they formed 12 thematic clusters.
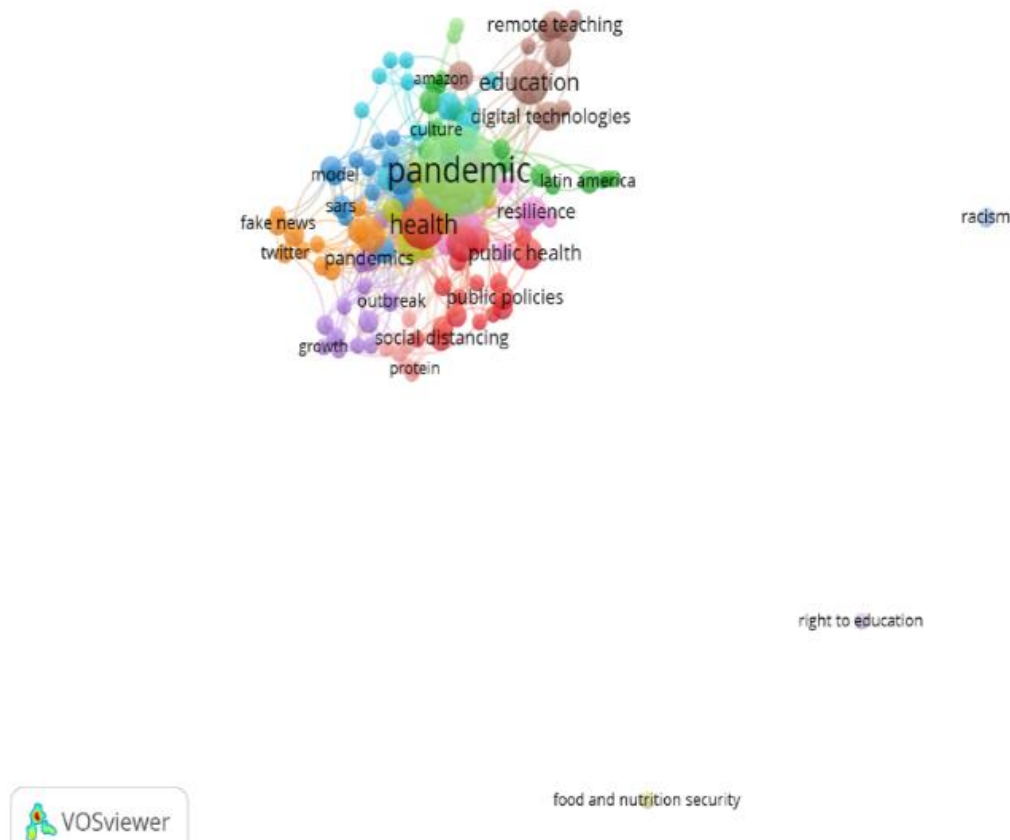

***Fig 10.** Co-occurrence Map of Brazilian Studies keywords*

The following is a table of 17 clusters with occurrence (with a minimum occurrence of8), number of links, total link strength, and average of normalized citations for each topic.

***Table 17.** Clusters and topics of Brazilian studies*

label	cluster	weight<Links >	weight<Total link strength>	weight<Occurrences >	Score<Avg. norm. citations>
pandemic	11	56	75	75	0.777
impact	9	29	38	13	0.5768
resilience	9	12	14	8	0
digital technologies	8	8	12	8	0.044
education	8	16	24	18	0.1174
innovation	8	5	5	8	0.044
remote education	8	3	5	8	0
exercise	7	22	35	11	0.4481
anxiety	4	25	37	8	1.7537
depression	4	28	41	11	2.8907

quarantine	4	28	39	11	2.8817
social isolation	4	20	29	12	0.155
performance	3	19	21	9	0.7549
crisis	1	17	22	13	0.2438
health	1	30	41	24	0.6982
public health	1	7	9	10	2.7929

Based on the connection and social network obtained between the keywords through VOS Viewer software, the keywords of Brazilian studies were analyzed based on centrality metrics (Table 18).

Table 18. Top 5 Keywords of Brazilian Studies Based on Centrality Criteria

Keyword	degree Centrality	Keyword	closeness Centrality	Keyword	Betweenness centrality
Social isolation (quarantine)	22	Social isolation (quarantine)	0.51	Education	**280.97**
Education	20	Education	0.51	Social isolation (quarantine)	**222.81**
Brazil	18	Brazil	0.49	Latin America	**188.98**
physical activity	14	Higher Education	0.49	Brazil	**188.52**
Higher Education	14	physical activity	0.48	Distance Learning	**78.56**

Table 18 shows that social isolation, education and Brazil have the highest degree and closeness centrality. Education, social segregation, and Latin America are at the center of the map, as depicted in Figure 9, and exhibit the highest betweenness centrality.

4. Discussion

The aim of this study was to identify the thematic trends of scientific productions in the fields of humanities and social sciences, taking into account the impact of Covid-19 on these studies in which researchers from leading three continents participated, using social network analysis tools and knowledge mapping software was also performed. In this regard, 15,616 studies related to Covid-19 in the mentioned fields for content analysis in the form of the top 9 countries of the three continents, respectively the United States (4635 studies), England (1794 studies), China (1282 studies), Italy (906 studies), Canada (838 studies), Spain (760 studies), India (661 studies), Brazil (581 studies) and Turkey (250 studies) were downloaded from the Web of Science and studied .The present study, after homogenizing the topics, began with 198 keywords related to Chinese studies, with 113 keywords related to Indian studies, with 75 keywords related to Turkish studies, with 198 keywords related to British studies, with 185 keywords related to studies Italy started with 185 keywords for Spanish studies, with 293 keywords for US studies, with 153 keywords for Canadian studies, with 130 keywords for Brazilian studies, and with 54 keywords for Chinese studies. According to the leading countries in publishing research related to Covid-19, the results of this study agree with the results of the research, Nasir et al. (2021), Handoko (2021), Roychowdhury, et al. (2022). However, in the study of Batoli and Sayyah (2020) China and Japan, participation in most of the research of Covid-19 has been assigned to itself. With a general look at the results of the analysis of the study clusters of the countries under study, it can be said that the focus of studies in the Americas is more on social sciences than studies on the other two continents. The study clusters of "China and Spain" and "India, Turkey, the England, Italy, the United States, Canada, and Brazil" also have more thematic overlap, but in the

studies of Turkey, Canada, and Brazil, there is a greater accumulation of clusters for reasons such as the existence of more studies and, of course, more keywords, as well as the dispersion of study topics.

A look at the findings on high-occurrence keywords indicates that the keywords Impact, Stress and Risk, in United States studies, Keywords Impact, Risk and Management, in UK studies, Keywords Impact, Depression, Anxiety and Mental Health in Chinese Studies, Impact Keywords, Emergency and Depression in Italian Studies, Impact, Depression and Anxiety, Stress in Canadian Studies, Keywords Impact, Anxiety, Social Media and connection in Spanish Research and social segregation, mental health, health policy in studies related to Brazil ,have gained the first to third ranks. To identify the most used topics (core) and central clusters of Covid-19 research in the fields of humanities and social sciences, were used the techniques of co-word and social network analysis. Among the seven identified clusters of Chinese studies, three (yellow, green, and red) whose concepts and terms include "depression, mental health, risk, social media, crisis management, impact" Which are the most frequent and common keywords in these clusters, so they have a central and important position and are the most important trends of researchers in this field in China; The highest degree, closeness and betweenness centrality among the related keywords are related to the keywords "China" in the studies of this country ;among the seven identified clusters of Indian studies, there are three clusters (yellow, blue and red) whose concepts and terms include "education, satisfaction, performance, risk, technology, management, impact, psychological impact" , Since they are the most common and common keywords in these clusters, so they have a central and important position and are the most important trends of researchers in this field in India; The highest degree, closeness and betweenness centrality among the related keywords are related to the keyword "India" in the studies of this country ;among the ten identified clusters of Turkish studies, four clusters (blue, yellow, green and red) which concepts and keywords include "depression,

anxiety, mental health, life satisfaction, online education, students, project implementation" humanitarian, tourism and survey", since most of the most common and common keywords are in these clusters, so it has a central and important position and the most important trends of researchers in this field in Turkey; The highest degree, closeness and betweenness centrality among the related keywords are related to the keywords "survey and life satisfaction" in the studies of this country ;Among the eight identified clusters of UK studies, four clusters (yellow, green, purple and red) which concepts and keywords include "higher education, online learning, management, innovation, mental health, depression, community, engagement' "Motivation is knowledge", since most of the most common and common keywords in these clusters, therefore they have a central and important position and are the most important trends of researchers in this field in the UK; The highest degree, closeness and betweenness betweenness centrality among the related keywords are related to the keywords "crisis and motivation" in the studies of this country ;among the seven identified clusters of Italian studies, four clusters (blue, purple, red, and orange) which concepts and terms include "depression, stress, resilience, mental health, online learning, technology, digitization, Management, experience", since most of the most common keywords in these clusters, therefore have a central and important position and are the most important trends of researchers in this field in Italy; The highest degree, closeness and betweenness centrality among the related keywords are to the keywords "resilience and risk perception" in the studies of this country ;Among the seven identified clusters of Spanish studies, three clusters (blue, green, and red) which concepts and keywords include "media, the Internet, anxiety, depression, motivation, and artificial intelligence" are the most common, They are frequent and common keywords in these clusters, so they have a central and important position and are the most important trends of researchers in this field in Spain; The highest degree, closeness and betweenness centrality among the related keywords are related to the

keywords "fake news and education" in the studies of this country; Among the six identified clusters of United States studies, four clusters (yellow, green, purple, and red) which concepts and terms include "depression, stress, social support, education, participation, influence, management, Leadership, employment, self-learning, distance education and science", since they are the most common keywords in these clusters, therefore has a central and important position and the most important trends of researchers in this constituencies are in the United States; The highest degree, closeness and betweenness centrality among the related keywords are related to the keyword "distance education" in the studies of this country; Among the ten identified clusters of Canadian studies, four clusters (purple, brown, green, and red) which concepts and terms include "education, depression, innovation, collaboration, communication, technology, governance, Personality, identity, social support", since they are the most common and common keywords in these clusters, therefore have a central and important position and are the most important trends of researchers in this field in Canada; The highest degree, closeness and betweenness centrality among the related keywords are related to the keywords "crisis and stability" in the studies of this country; Among the twelve identified clusters of Brazilian studies, four clusters (brown, red, orange, and green) which concepts and keywords include "education, digital technology, Amazon, culture, fake news, Twitter, public policy, social distancing", since it is the most common keyword in these clusters, so it has a central and important position and the most important trends of researchers in this field. The highest degree, closeness and betweenness centrality among the related keywords is related to the keywords "learning and education" in the studies of this country.

Overall, as per Haghani et al. (2020) and Liu et al. (2022), gradually have emerged an interdisciplinary approach and collective scientific effort to comprehend and address the diverse impacts of this crisis, which extend beyond biomedical hazards. as well, Fang and Costas' (2020) study, in the analysis of the co-word network of hashtags and tweet titles revealed that during the studied months, a significant portion of tweets were associated with clinical research on the disease. gradually discussions have shifted towards practical treatment strategies for Covid-19, government actions, healthcare, and the societal and economic impact of the virus. It's as if a comprehensive scientific understanding of the Covid-19 crisis could guarantee improved readiness for future pandemics.

As if a full scientific understanding of the Covid-19 crisis could ensure better preparedness for future pandemics. In the Baratlo (2023) study, the keywords of research on Covid-19 in the fields of social sciences and humanities categorized into three clusters: "Multiple dimensions of crises in the shadow of the Covid-19 pandemic crisis", "Ethics, justice and committed participation in society", and "Education and technological infrastructure". In the research of Nasir et al. (2021), four research streams: "Social and economic effects of epidemic disease," "Diseases and disease control," "Prevalence of Covid-19" and "Infectious diseases and the role of international organizations" were identified. In the Handoko (2021) study, the keywords of research on Covid-19 were 14 clusters (e.g., SMEs, aviation, tourism, banking and finance, supply chain, economic growth, and economics. Digital). According to his findings the number of Covid-19 articles on economics and business is relatively high and continues to grow significantly. Keyword analysis showed that Covid-19 had a tremendous impact on all sectors of the economy. The emergence and identification of many of the topics and issues under the research have been based on various issues in the period of Covid-19, that some of which and the causes and factors affecting them are discussed below.

The new coronavirus was not only a complete shock in itself, but also caused stress in public health, the global economy and social life around the world. Covid-19 has emerged as a moving pandemic, as an important and contemporary health issue that has shaped the course of human existence. In other words,

with the emergence of the Covid Crisis 19, the majority of societies and governments due to global quarantine and prevent the spread of coronavirus and consequently its impact on many individual, cultural and social relationships such as psychological effects, electronic education schools and universities, closures and change in many businesses, economics, etc. faced wider challenges such as social isolation and a fundamental change in life in general (Shanfelt, et al., 2020). The emergence of concepts like empowerment, resilience, participation, governance, smartening and digital technologies, sustainable development, etc. to address this crisis demonstrated new thinking and policies in the new era. Governments and societies undoubtedly made every effort to manage this crisis and enhance their performance in minimizing its negative consequences. Due to the crisis, educational centers, including schools and universities, shifted to virtual and e-learning. This change affected learner-teacher interaction, teaching time, e-learning quality, and learning inequality, impacting academic performance. In normal classrooms, participation in the learning process is more controllable, while in e-classes, learners' participation and their support for each other are often minimized, this altering teaching strategies, and students should adapt to these changes. These problems reduce the level of student involvement. Despite challenges, e-learning offers opportunities and benefits for learners and the education system.

On the other hand, Following the spread of the new coronavirus, countries implemented prevention methods like social distancing and virtual communication. Among the functions of social networks in this period, we can mention information and e-learning in the context of social networks, business meetings and the prosperity of e-businesses, knowledge sharing and dissemination, family and virtual friendship cycles, and so on. However, this communication platform caused or exacerbated many problems, for example, the market for spreading fake news and information through social networks become hotter than before. The corona virus also affected many economies around the world, with unemployment and poverty rates rising

in many countries. On the other hand, the prevalence of Covid-19 disease in all countries of the world changed people's lifestyles and, in many cases, endangered the psychological health of communities, for reasons such as mysterious, uncontrollable, unpredictable, and contagious. It provided the ground for the spread of psychological disorders in the mental health dimension of individuals. Therefore, identifying the cause of these disorders in different people in society was seemed necessary to maintain appropriate mental health by using appropriate psychotherapy methods. In other words, one of the main concerns in research had been how to reduce anxiety, depression and post-traumatic stress disorder as well as other psychological disorders in different parts of society and maintain mental health. Research had shown the significance of culture, religion, religiousness, and spiritual needs during the COVID-19 pandemic (Ayub, S., et al., 2023; Adam B., et al., 2023; Fardin, 2020; Sisti et al., 2023; Rocío de Diego-Cordero, et al., 2023). Evidence has indicated that addressing individuals' spiritual needs was associated with reduced stress, anxiety, and depression, while also strengthening resilience and hope (de Diego-Cordero, et al., 2022). Studies have highlighted the impact of spirituality on resilience and coping during the COVID-19 crisis (Anka, 2020), During crises, spirituality serves as a vital source of hope, aiding individuals in navigating challenging times. Additionally, the role of faith communities in providing spiritual and psychosocial support during the pandemic, particularly focusing on mental health and spiritual well-being in times of crises, was emphasized (Goodwin and Kraft, 2022). In this here, it is worth considering the focus on religion, spirituality, religiosity, mental health, public health, depression, anxiety, as well as social media and ethics in Map 1 of this article.

5. Conclusion

This study illustrates the knowledge structure of Covid-19 in the humanities and social sciences, focusing on top countries in three leading continents. The research findings support researchers and stakeholders in conducting purposeful studies aligned with

practical issues, emphasizing coherent studies and preventing redundant research in this area. The results are valuable for guiding policy makers, planners, and managers. This type of research enables researchers to develop a plan to enhance scientific production and balanced subject development to manage the effects of this global crisis. Additionally, the intellectual structure of Covid-19 knowledge in these fields, categorized by leading countries, can inform future studies on important issues and thematic gaps, avoiding unnecessary repetition.

Acknowledgement and Sponsoring Information

Declaration of Competing Interest

The author declares that he has no competing financial interests or known personal relationships that would influence the report presented in this article.

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