



A scientometric approach to psychological research during the COVID-19 pandemic

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Abstract

During the COVID-19 pandemic, modern science demonstrated its ability to respond well to the health crisis by publishing useful and reliable information. This disease has also led to an increase in psychological publications in this field. However, most scientometric studies have focused on medical aspects, and social science research has been neglected. Therefore, to fill this research gap, we analyzed the research on COVID-19 in the field of psychology to provide an insight into the perspective, research fields, and international collaborations. Data were collected from the Web of Science database and analyzed using Citespace and Bibliometrix (Biblioshiny). The overall performance of the documents was described, and then keyword co-occurrence and co-authorship networks were visualized. Fifteen main clusters were formed by drawing document co-citation network. The result indicates that *Anxiety, mental health, delirium, loneliness, and suicide* were important topics for researchers. Considering the special conditions that COVID-19 created for human societies, perhaps one of the most important subjects in the field of health is psychological studies. Using the results of this study, psychology researchers can identify their potential colleagues and research gaps in the subject of Covid-19.

Keywords Psychological research · COVID-19 · Scientometric · Scientific network · Citespace · Bibliometrix (Biblioshiny)

Mathematics Subject Classification 00A06 Mathematics for nonmathematicians (engineering social sciences etc.) · 00A99 None of the above but in this section · 91C05 Measurement theory in the social and behavioral sciences · 94C15 Applications of graph theory to circuits and networks

Introduction

Background

More than two years have passed since the COVID-19 worldwide pandemic. During the COVID-19 pandemic, science demonstrates its ability to respond well to the health crisis by

producing useful and reliable information (Nowakowska et al., 2020; Colavizza et al., 2021). Since the scientific community is trying to understand and deal with this pandemic, scientific research and the pattern of publishing articles have been affected by this crisis (Aviv-Reuven & Rosenfeld, 2021). So, this disease led to the exponential growth of scientific publications related to this disease. A review of the publications related to COVID-19 shows that since 2020, in addition to the importance of the health field in scientific publications, there is a change in approach towards other scientific fields (Colavizza et al., 2021).

Considering the special conditions during the covid-19 pandemic, including the uncertainty of treatment, the lack of health facilities, and especially the social distance that hindered communication between people which can reduce the psychological burden of the disease, many psychological problems arose. This caused much research to be done and the search in reliable databases confirms this. Therefore we can see that publications on psychology as a health-related field have similar growth as other health fields (Obschonka et al., 2021).

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To obtain scientific and comprehensive insights from a wide range of scientific publications related to COVID-19, several scientometric studies have been conducted that make a general view of research on COVID-19 (Colavizza et al., 2021; Malik et al., 2021; Okhovati & Arshadi, 2021). These studies reviewed scientific publications considering time, geography, subject limitations, etc. (Farooq et al., 2021; Tornberg et al., 2021; Zhang et al., 2020; Casado-Aranda et al., 2021). They showed that publications' content covers a wide range of topics (Colavizza et al., 2021), which requires a comprehensive and in-depth approach with emphasis on different disciplines in the research on COVID-19 (Aristovnik et al., 2020; Santos et al., 2022). But, a closer look shows that scientometric studies have focused on medical aspects, and social science research has been neglected (Liu et al., 2022).

The results of scientometric studies also show that some of them have investigated the mental and psychological effects of COVID-19 disease (Santos et al., 2022; Liu et al., 2022). A scientometric study by Liu et al. (2022) showed that the most common keywords in social science research on COVID-19 are related to the field of psychology and mental health. The research conducted in the field of psychology during the pandemic can be divided into clinical aspects (Freedland et al., 2020), psychological consequences of restrictions such as quarantine and reduction of social relations (Pillay & Barnes, 2020), and the variety of consequences according to regional, cultural, groups, and individual differences (Romano et al., 2021; Freedland et al., 2020). So, the publications' content covers a wide range of topics (Colavizza et al., 2021), which requires a comprehensive and in-depth approach with emphasis on different disciplines in the research on COVID-19 (Aristovnik et al., 2020). The results of scientometric studies have shown that mental health and psychology had the highest international attention in the field of social sciences and research hot spots were mainly on this subject (Liu et al., 2022), therefore the study of this field of scientific publications with a scientometric approach can be helpful. Also, it can be said that the research related to the psychological aspects of the COVID-19 disease have high value even after the end of the pandemic because its psychological consequences still dominate human society.

Objective

Among the research related to COVID-19, we did not find any scientometric study in the field of psychology. In addition, regarding the extent and relative coherence of the research on COVID-19, the analysis of this volume of data requires bibliometric and scientometric methods. Therefore, to fill this research gap, we analyzed the research on

COVID-19 in the field of psychology to provide insight into the perspective, research fields, and international collaborations.

The results of this research can be useful for finding potential collaborators and identifying the boundaries and gaps in the research on COVID-19 in the field of psychology and can be used to determine the direction of future research.

Methods

Data source and retrieval strategies

This study mainly followed the common methods in scientometrics (Li et al., 2021). Based on the purpose of the research, we collected and analyzed the data as follows. Using the following search strategy, data were collected from the Web of Science database.

TS=((("COVID-19" OR "coronavirus disease 2019" OR "2019-nCov" OR "2019 novel coronavirus" OR "SARS-CoV-2" OR "Severe acute respiratory syndrome coronavirus 2" OR "novel coronavirus disease 19" OR "novel coronavirus disease-19" OR "SARS2" OR "SARS-2" OR "COVID-2019" OR "COVID19")) AND ("Mental disorders" OR Depression OR "Stress Disorders, Post-Traumatic" OR Grief OR Violence OR "Anxiety Disorders" OR "Bipolar Disorder" OR "Psychotic Disorders" OR "Obsessive-Compulsive Disorder" OR "Feeding and Eating Disorders" OR Suicide OR "Mental Health" OR "Social Stigma" OR "Psychosocial Support Systems" OR "Sleep Wake Disorders" OR Dysomnias OR "Sleep Disorders, Intrinsic" OR "Lewy Body Disease" OR "Psychiatric Status Rating Scales" OR "Cognition Disorders" OR "Neurocognitive Disorders" OR Delirium OR "Somatoform Disorders" OR "Paroxysmal Extreme Pain Disorder" OR "Stress Disorders, Traumatic, Acute" OR Dementia OR Loneliness OR "Panic Disorder" OR "Phobic Disorders" OR "Mental Health Services" OR "Domestic Violence" OR alcoholism OR "Burnout, Psychological" OR "Social Isolation" OR "Alzheimer Disease" OR "Adjustment Disorders" OR "Adolescent Psychiatry" OR "Protective Factors" OR "Amnesia, Retrograde" OR Unconsciousness OR "Substance-Related Disorders" OR "Adaptation, Psychological" OR Anxiety OR "Child Abuse" OR "Stress, Psychological" OR "Psychophysiological Disorders"))).

Based on the search on May 10, 2022, 19,882 documents were retrieved. These documents' full record and cited references data were downloaded from the export section of the database in plain text format. So, 40 .txt files were saved. Duplicate data were removed by using the data section in CiteSpace software, and finally, 19,721 documents were saved for further analysis.

Data analysis and visualization

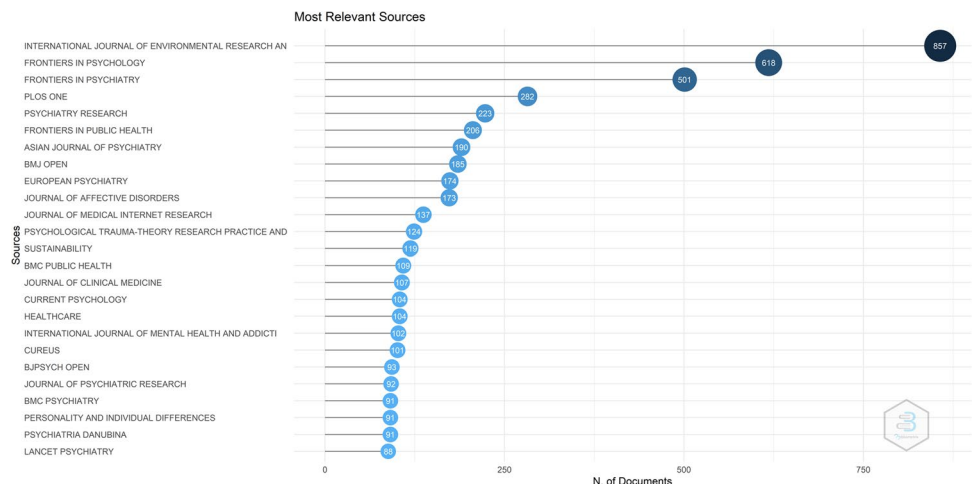
Common relationships in scientometric studies include citation relations, word co-occurrence, and co-authorship relationships (Van Eck & Waltman, 2014). In this study, all three types of relationships were used.

Citespace (Chen, 2006; Chen et al., 2012) and Bibliometrix (Biblioshiny) (Aria & Cuccurullo, 2017) software were used to construct and illustrate the scientific network for the publications of COVID-19 in the field of psychology. Cite space was used to draw networks, co-occurrence, and co-citation analysis. And, Bibliometrix (Biblioshiny) was used to extract descriptive information, and Bradford’s and Lotka’s law.

Table 1 Main descriptive information about data

Description	Results	Document types	Results
Timespan	2019:2022	article	15,395
Sources (Journals, Books, etc.)	3807	book chapter	17
Documents	19,882	data paper	25
Average citations per document	9.213	proceedings paper	79
References	414,244	retracted publication	4
Authors		book review	4
Authors	79,323	correction	78
Single-authored documents	1668	editorial material	1105
Authors per Document	3.99	letter	939
Co-Authors per Documents	5.8	meeting abstract	617
Collaboration Index	4.27	Others	36
		review	1583

Fig. 1 Most relevant sources for COVID-19 Psychology Articles



Results

Global distribution of psychology publications about COVID-19

In total, 19,721 documents related to COVID-19 in the field of psychology were identified that were published in 3807 sources during 2019–2022. The average citation received by each document was 9.213. Considering the very short life of retrieved records, it indicates the importance of studies in this field due to the COVID-19 pandemic. Also, Collaboration Index = 4.27 indicates a relatively high level of collaboration among authors in this field (Table 1).

Figure 1 shows the core journals of this field based on the Bradford law, and Fig. 2 shows the most cited journals among the collected data.

Authors from 131 countries contributed to the writing of these publications. Among them, the most productive countries were the United States (4198 documents), China (1827 documents), England (1457 documents), and Italy (1139 documents). Among the first 20 countries in terms of the number of documents, Saudi Arabia, Australia, England, and the Netherlands have the most international contributions (Table 2).

Figure 3 shows the most prolific authors based on Lotka’s law. In this chart, 397 authors (about 0.5%) out of a total of 79,323 authors have contributed to writing more than 10 documents. On the other hand, 62,052 authors (78.227%) participated in only one document.

In the following, we analyze the data based on co-occurrences.

Organizations’ collaboration network

The most prolific organization in publishing psychological documents related to COVID-19 is Kings College London

Fig. 2 Most local cited sources for COVID19 Psychology Articles

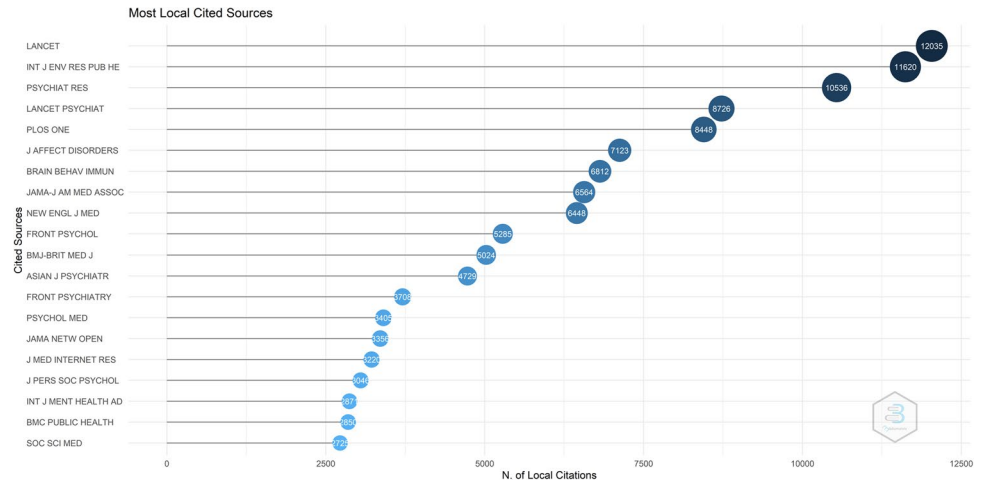


Table 2 Top most prolific countries for COVID19 psychology articles

Country	Articles	SCP*	MCP**	MCP_Ratio	Total Citations	Citation per Article
USA	4198	3614	584	0.1391	34,509	8.220
China	1827	1291	536	0.2934	36,621	20.044
United Kingdom	1457	977	480	0.3294	19,715	13.531
Italy	1139	872	267	0.2344	14,397	12.640
Canada	820	603	217	0.2646	7000	8.537
India	817	689	128	0.1567	6673	8.168
Australia	701	454	247	0.3524	5836	8.325
Spain	697	533	164	0.2353	6248	8.964
Turkey	655	608	47	0.0718	3033	4.631
Brazil	639	509	130	0.2034	3698	5.787
Germany	553	394	159	0.2875	3720	6.727
Iran	352	251	101	0.2869	2827	8.031
France	279	199	80	0.2867	2725	9.767
Japan	268	220	48	0.1791	2483	9.265
Poland	251	202	49	0.1952	1657	6.602
Israel	249	174	75	0.3012	2064	8.289
Saudi Arabia	224	133	91	0.4062	1095	4.888
Korea	217	171	46	0.212	821	3.783
Pakistan	195	136	59	0.3026	1218	6.246
Netherlands	190	132	58	0.3053	1974	10.389

*Single Country Participation
 **Multi Country Participation

with 22 documents, followed by Harvard Medical School, University of Toronto, Columbia University, and Wuhan University with 21, 16, 14, and 13 documents respectively. Since the nodes with a centrality above 0.1 are considered as nodes that shape the network structure, the most effective organization in terms of shaping the network structure in the first to third ranks are the above-mentioned prolific organizations. The University of British Columbia, and the

University of Oxford are in the next ranks (Table 3). The organization’s collaboration network can be seen in Fig. 4.

Countries collaboration network

Figure 5 shows the collaboration network of the countries. In this network, Modularity $Q=0.7857$ and Weighted Mean Silhouette $S=0.9483$ indicate the good differentiation of

Fig. 3 The frequency distribution of scientific productivity (Lotka's Law) for COVID19 Psychology Articles

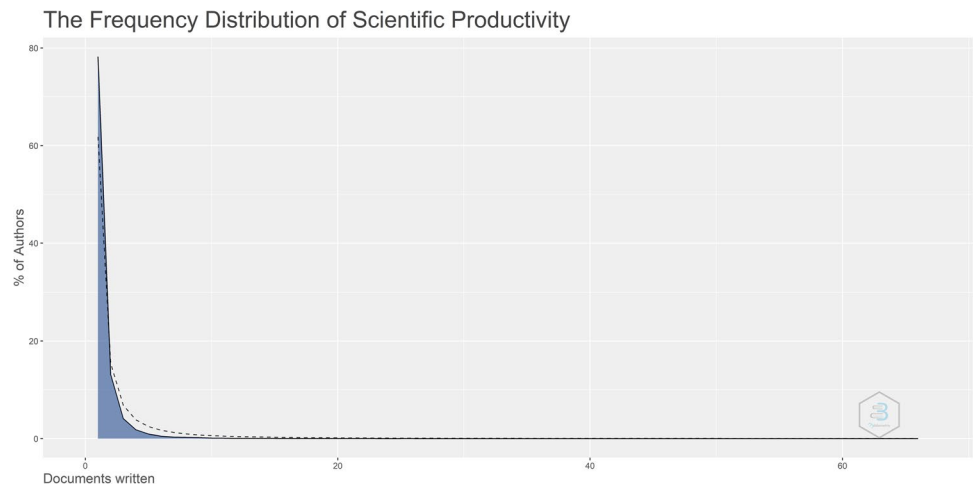


Table 3 Top Most productive organizations for COVID19 Psychology Articles

Freq	Degree	Centrality	Organization	Cluster
22	35	0.22	Kings Coll London	1
21	30	0.22	Harvard Med Sch	6
16	27	0.21	Univ Toronto	4
14	15	0.05	Columbia Univ	2
13	9	0.04	Wuhan Univ	3
12	17	0.05	Huazhong Univ Sci & Technol	3
11	27	0.1	Univ Oxford	1
11	15	0.08	Univ Melbourne	5
11	11	0.05	Sapienza Univ Rome	0
10	19	0.05	Univ Washington	4
10	18	0.13	Univ British Columbia	2

clusters and the homogeneity of nodes in each cluster. In this network, the separation of countries is evident, which is normal considering the conditions of the pandemic as well as the speed and the short period of publication of the reviewed articles. Regarding the above conditions, it seems that the cooperation between countries is the continuation of past cooperations.

Keywords co-occurrence

By choosing keywords as nodes, the co-occurrence network of keywords was drawn. In this network, the keywords with the highest frequency are: *Mental health, depression, anxiety, social isolation, stress,* and *psychological impact.* The most important words that played a role in shaping the

Fig. 4 Organizations' collaboration network for COVID19 Psychology Articles

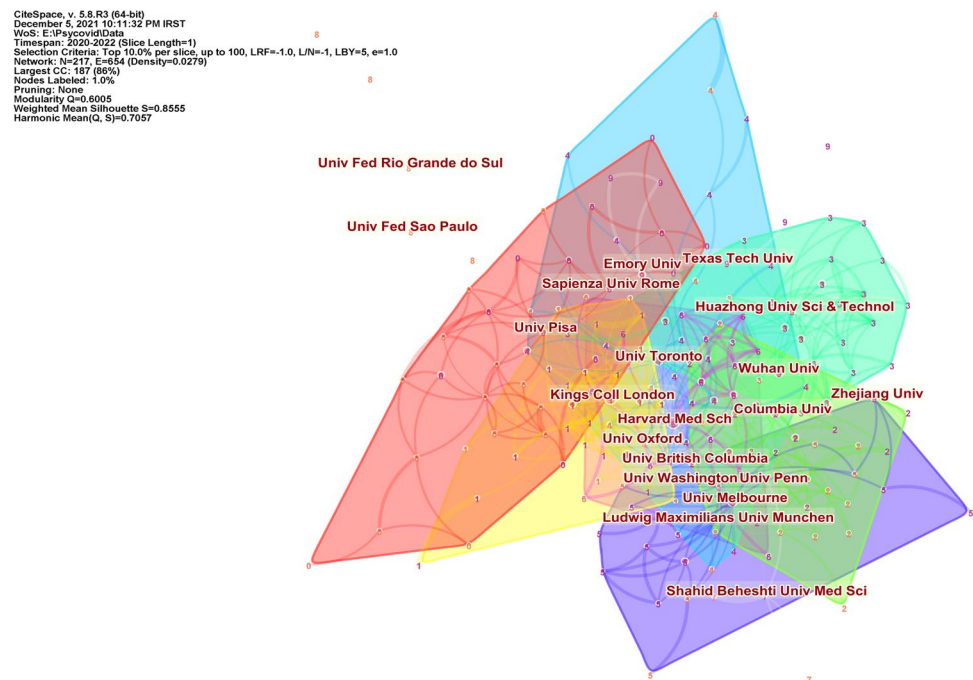


Fig. 5 Countries' collaboration network for COVID19 Psychology Articles

CiteSpace, v. 5.8.R3 (64-bit)
 December 5, 2021 10:18:49 PM IRST
 WoS: E:\PsychCovidData
 Timespan: 2020-2022 (Slice Length=1)
 Selection Criteria: Top 100.0% per slice, up to 100, LRF=1.0, L/N=1, LBγ=5, e=1.0
 Network: N=85, E=110 (Density=0.0246)
 Largest CC: 85 (89%)
 Nodes Labeled: 1.0%
 Pruning: Pathfinder
 Modularity Q=0.7537
 Weighted Mean Silhouette S=0.9482
 Harmonic Mean(Q, S)=0.85093

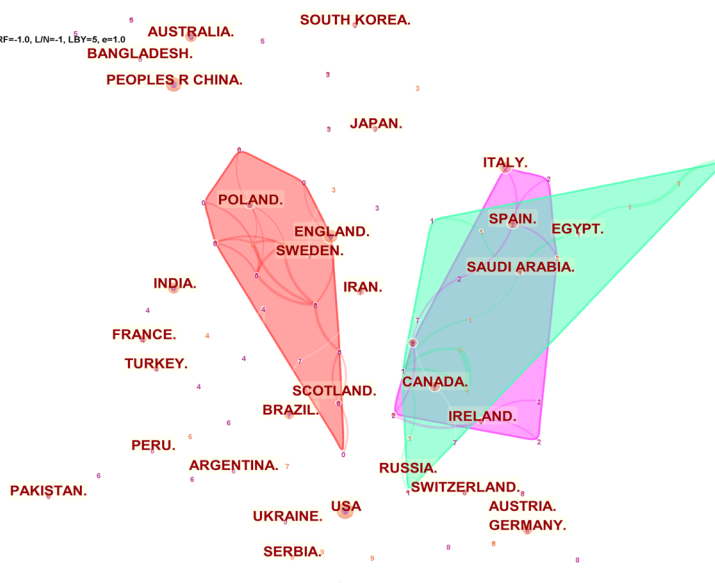


Table 4 Main keywords in the keywords co-occurrence network for COVID19 Psychology Articles

Freq	Degree	Centrality	Keyword
342	8	0.11	mental health
188	20	0.19	depression
140	3	0	anxiety
80	27	0.24	social isolation
75	14	0.06	stress
55	19	0.12	psychological impact

network were those that had a centrality above 0.1. These keywords were: *social isolation*, *Post Traumatic Stress Disorder (PTSD)*, *depression*, *alcohol use disorder*, *psychological impact*, *mental health*, *healthcare workers*, and *Renin-Angiotensin System*, respectively (Table 4). Despite the higher frequency of *mental health*, *depression*, and *anxiety*, the most influential keyword is *social isolation* caused by the quarantines created to limit the spread of COVID-19, followed by *PTSD*, *depression*, and *alcohol use disorder*. A closer look shows that all of them are related to Loneliness and isolation of people, and dealing with these issues has shown their importance in pandemic conditions. The noteworthy point is that *social isolation* has the highest centrality and the highest degree among related keywords (Fig. 6).

Main Clusters

Document co-citation network was drawn to determine the main clusters Fig. 7 shows the co-citation network of this field.

In this network, 15 clusters were formed. Modularity $Q=0.7216$ and Weighted Mean Silhouette $S=0.8442$ indicate high differentiation and homogeneity of nodes in each cluster. The largest cluster (#0) with 148 members was named *Anxiety*. After that, cluster #1 with 124 members was named *SARS Cov-2*, which can be named *Intolerance of Uncertainty* by examining the possible titles. Clusters #2 to #6 with 131, 111, 107, 107, and 102 members dealt with *dementia*, *intimate partner violence*, *depression*, *healthcare workers*, and *mental health*. The formation of dense clusters in the fields of *anxiety*, *mental health*, *delirium*, *loneliness*, and *suicide*, despite the short life of articles in this field, shows the importance of these topics for researchers (Table 5).

To determine the most important documents, it is better to use the sigma index, which combined from centrality and Burstness indices. Based on this, we listed the most important documents in the investigated field in Table 6.

The first document is related to the Centers for Disease Control and Prevention (CDC), which shows the importance and efficiency of the CDC and the active participation of this center.

Among the most important articles, only Matthews (2016) was published before the pandemic. It seems that the special conditions of the pandemic and the psychological consequences of the lockdown have caused articles in this field to cite articles published during the pandemic. On the other hand, due to the importance of facilitating and speeding up access to the information related to COVID-19, the publishers made this category of articles available to everyone as open access. This could also have caused the authors to use these articles more than other articles. Matthews' article, which is placed in cluster #4, examines the relationship

Fig. 6 Keywords cooccurrence network for COVID19 Psychology Articles

CiteSpace, v. 5.8.R3 (64-bit)
 December 7, 2021 10:45:03 PM IRST
 WoS: E:\PsychovidData
 Timespan: 2020-2022 (Slice Length=1)
 Selection Criteria: Top 10.0% per slice, up to 100, LRF=-1.0, L/N=-1, LBY=5, e=1.0
 Network: N=178, E=515 (Density=0.0327)
 Largest CC: 178 (100%)
 Nodes Labeled: 1.0%
 Pruning: Pathfinder
 Modularity Q=0.9644
 Weighted Mean Silhouette S=0.8313
 Harmonic Mean(Q, S)=0.7286

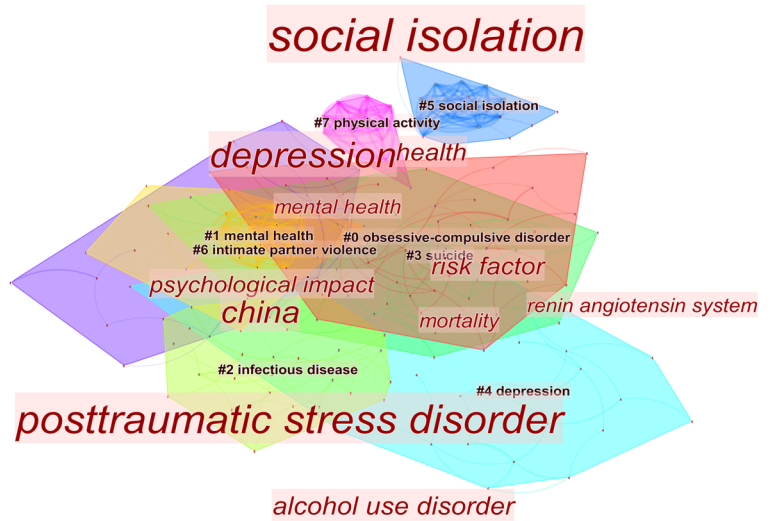
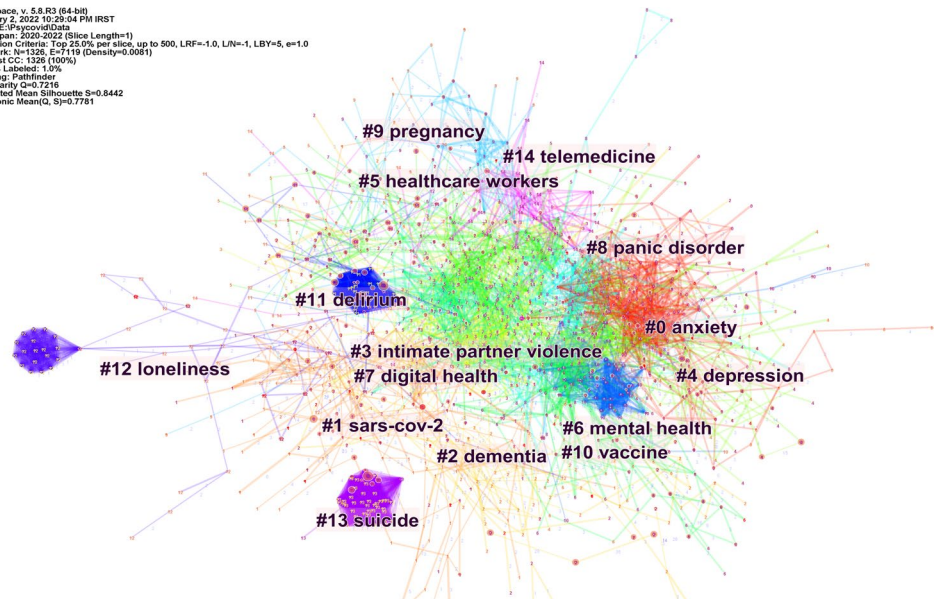


Fig. 7 Main clusters of Psychocovid network for COVID19 Psychology Articles

CiteSpace, v. 5.8.R3 (64-bit)
 January 2, 2022 10:20:04 PM IRST
 WoS: E:\PsychovidData
 Timespan: 2020-2022 (Slice Length=1)
 Selection Criteria: Top 25.0% per slice, up to 500, LRF=-1.0, L/N=-1, LBY=5, e=1.0
 Network: N=1328, E=7119 (Density=0.0081)
 Largest CC: 1328 (100%)
 Nodes Labeled: 1.0%
 Pruning: Pathfinder
 Modularity Q=0.7219
 Weighted Mean Silhouette S=0.8442
 Harmonic Mean(Q, S)=0.7781



between social isolation and loneliness, and depression, also their relationship with genetics. In this article, it was found that loneliness has a closer relationship with depression. The genetic relationship between isolation and loneliness and depression indicate genetic influences in the occurrence of these two phenotypes.

Discussion

The COVID-19 pandemic affected physical, psychological, social, and economic aspects of human life worldwide. The psychological aspects of Covid-19 are important during the disease period and after that. This study investigated the

status of scientific publications on psychology in relation to Covid-19 using scientometrics and network analysis.

Based on the results, the United States had the largest number of scientific productions in the investigated field. During the COVID-19 pandemic, this country had the highest number of patients and deaths caused by Covid-19, and the pandemic situation disrupted all aspects of the people’s lives in this country (Melendez, 2021). Therefore, it is natural that the researchers in this country pay special attention to the psychological effects of COVID-19.

European and American organizations had the most scientific publications of psychology in the field of COVID-19, and the only non-American/non-European organization among top ten organizations was China’s Wuhan University.

Table 5 Main clusters information for COVID19 psychology articles

Cluster	size	silhouette	Mean Year	Most Representative Terms
0	148	0.8	2019	anxiety (36.53, 1.0E-4); depression (19.25, 1.0E-4); mental health (18.49, 1.0E-4); sars-cov-2 (13.92, 0.001); loneliness (10.18, 0.005)
1	134	0.804	2019	sars-cov-2 (16.31, 1.0E-4); obsessive-compulsive disorder (13.68, 0.001); intolerance of uncertainty (12.74, 0.001); children (9.99, 0.005); health anxiety (8.87, 0.005)
2	131	0.746	2019	dementia (9.55, 0.005); (9.48, 0.005); obsessive-compulsive disorder (7.09, 0.01); delirium (6.41, 0.05); older people (4.67, 0.05)
3	111	0.779	2019	intimate partner violence (22.39, 1.0E-4); domestic violence (21.78, 1.0E-4); child abuse (11.05, 0.001); lockdown (7.32, 0.01); psychological problems (6.65, 0.01)
4	107	0.854	2019	anxiety (44.86, 1.0E-4); depression (44.55, 1.0E-4); sars-cov-2 (20.21, 1.0E-4); (13.17, 0.001); loneliness (12.5, 0.001)
5	107	0.832	2019	anxiety (10.38, 0.005); healthcare workers (7.55, 0.01); health care professionals (6.33, 0.05); psychopathological symptoms (6.33, 0.05); delirium (5.78, 0.05)
6	102	0.875	2019	anxiety (11.27, 0.001); depression (11.09, 0.001); mental health (8.46, 0.005); dementia (7.71, 0.01); neuropsychiatric (7.22, 0.01)
7	86	0.811	2019	sars-cov-2 (9.29, 0.005); digital health (7.73, 0.01); generalized anxiety (6.13, 0.05); anxiety (6.04, 0.05); generalized anxiety disorder-7 (5.71, 0.05)
8	85	0.83	2019	sars-cov-2 (8.23, 0.005); panic disorder (7.68, 0.01); vaccine (7.68, 0.01); tobacco use cessation (7.11, 0.01); pics (7.11, 0.01)
9	62	0.916	2019	pregnancy (56.59, 1.0E-4); pregnant women (22.96, 1.0E-4); breastfeeding (22.96, 1.0E-4); maternal mental health (17.21, 1.0E-4); childbirth (11.47, 0.001)
10	53	0.965	2018	sars-cov-2 (12.75, 0.001); vaccine (6.73, 0.01); post-infectious encephalitis (6.61, 0.05); structure-activity relationship (sar) (6.61, 0.05); novel coronavirus (6.61, 0.05)
11	52	0.985	2019	depression (12.36, 0.001); healthcare workers (9.95, 0.005); anxiety (9.75, 0.005); sars-cov-2 (8.22, 0.005); delirium (7.32, 0.01)
12	52	0.95	2019	loneliness (52.37, 1.0E-4); social isolation (12.75, 0.001); sars-cov-2 (8.49, 0.005); coronavirus disease 2019 (COVID-19) (7.12, 0.01); rapid assessment (6.24, 0.05)
13	48	0.999	2019	suicide (20.41, 1.0E-4); loneliness (9.57, 0.005); physical activity (7.99, 0.005); telepsychiatry (7.99, 0.005); sars-cov-2 (7.9, 0.005)
14	48	0.89	2018	telemedicine (6.81, 0.01); Wuhan (5.86, 0.05); suicide ideation (5.86, 0.05); atypical (5.86, 0.05); anxiety symptom (5.86, 0.05)

Table 6 The most pivotal documents

Sigma	References	DOI	Cluster ID
0.11	Centers for Disease Control and Prevention, 2020, COR DIS 2019 COVID 1, 0, 0	–	0
0.08	Webb Hooper M, 2020, JAMA-J AM MED ASSOC, 323, 2466	https://doi.org/10.1001/jama.2020.8598	13
0.07	Rossi R, 2020, JAMA NETW OPEN, 3, 0	https://doi.org/10.1001/jamanetworkopen.2020.10185	11
0.07	Williamson EJ, 2020, NATURE, 584, 430	https://doi.org/10.1038/s41586-020-2521-4	6
0.05	Brown E, 2020, SCHIZOPHR RES, 222, 79	https://doi.org/10.1016/j.schres.2020.05.005	10
0.05	Matthews T, 2016, SOC PSYCH PSYCH EPID, 51, 339	https://doi.org/10.1007/s00127-016-1178-7	4
0.05	Fakoya OA, 2020, BMC PUBLIC HEALTH, 20, 0	https://doi.org/10.1186/s12889-020-8251-6	12
0.04	Montemurro N, 2020, BRAIN BEHAV IMMUN, 87, 23	https://doi.org/10.1016/j.bbi.2020.03.032	11
0.04	Hui DS, 2020, INT J INFECT DIS, 91, 264	https://doi.org/10.1016/j.ijid.2020.01.009	10
0.04	Singhal T, 2020, INDIAN J PEDIATR, 87, 281	https://doi.org/10.1007/s12098-020-03263-6	0

Kim and Cho (2021) also showed that European and American countries were more interested in social sciences research than life sciences during the pandemic.

In the analysis of the co-occurrence network of keywords, *social isolation* was identified as the most influential

concept, followed by *PTSD*, *depression*, and *alcohol use disorder*. The most influential way to fight against COVID-19 was social distancing, which was strictly applied in most of the countries affected by COVID-19 before the vaccine development. Due to the limitation of social relations,

people experienced intense psychological pressures, which led to the aggravation of mental disorders among people in society, and for this reason, the study of these disorders has received a lot of attention in the field of psychology. This shows that social isolation has consequences such as *PTSD*, *depression*, and *alcohol use disorder*, which is also mentioned in the research of Pillay and Barnes (2020).

The rapid spread of COVID-19 and its health, economic and social consequences affect people's mental health. Therefore, it will have consequences such as *anxiety*, *mental health*, *delirium*, *loneliness*, and *suicide* (Miyah et al., 2022; Chatterjee et al., 2020). The results of the present study also showed the importance of these terms for researchers.

Considering the importance of *Burnout* in the studies of Covid-19 (Lau et al., 2022), we expected this concept to be highlighted in the drawn networks; but despite including the relevant keyword in the search phase, this concept was not observed in the drawn networks. Considering that in drawing networks, citations are vitally important, it seems that documents related to *Burnout* have not received enough citations to be highlighted in the network.

The results of the research showed that the desire for international collaborations was low, while the results of past research show that it is increasing among psychology professionals (Henriksen, 2016). It seems that the special conditions of the pandemic, the need for rapid publication of research and the difference in the psychological consequences of Covid-19 in different societies (Romano et al., 2021; Freedland et al., 2020) have reduced cooperation between countries.

Implications

Considering the effects of Covid-19 on human societies, psychological research became important along with medical studies. Using the results of this study, psychology researchers can identify their potential colleagues and research gaps in the subject of Covid-19. This can affect the future direction of research in the field. The results of this research showed that collaboration between countries was very low. Maybe psychology researchers can use the results of this study to identify their research colleagues around the world and increase international collaboration.

Research limitations

- The impossibility of using PubMed data as a special database in the field of health and medicine in this study;
- The impossibility of checking all documents and citations received by these documents due to their dispersion in different citation databases (Scopus & Web of Science);

- The limitedness of the reviewed studies to a short period of time, which reduced the opportunity to receive full citations.

Data availability The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

Ethical approval This article does not contain any studies involving human participants performed by any of the authors.

Informed consent Not applicable.

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