

COVID-19 Across Social Sciences Literature: A Co-Word Study

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ABSTRACT

Besides the concerns about medical, health, and mental health issues as the essential parts of research on COVID-19, social sciences, and humanities research also have been affected by the situation. In this sense, the primary purpose of the current study was to map the conceptual structure of COVID-19 literature in the social sciences area. About 2587 documents related to "COVID-19" in the social sciences which indexed in the Scopus database during 2020 were considered as the research data. Based on the cohesion measure, the co-word network of COVID-19 literature in the social sciences area was cohesive. The main themes raised in the research clusters were: Environmental issues, social quality service, crisis management, social support, and COVID-19 social effects. Research results revealed that emerging thematic clusters contain topics such as climate change, environment, vulnerable populations, culture, and quality of life, fake news, and social identity. In addition, the present study also predicted that at the end of the COVID-19 pandemic, its social effects on societies could be consistent; thus, it is recommended that research on COVID-19 effects in the area of social sciences in universities and research institutions should be reconsidered.

Keywords: COVID-19, Social sciences, Co-word Analysis, Co-occurrence Analysis, Cluster analysis, Bibliometrics.

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INTRODUCTION

The rapid worldwide spread of the COVID-19 pandemic had unexpected effects on the medical, economic, social, cultural, and political spheres of all countries. Along with these undesirable rapid changes, the world scientific community faced one of its serious challenges to find a solution to end this disastrous pandemic. Therefore, a plethora of research in various fields has focused on COVID-19 and its influences on people's lives. The field of bibliometrics, in turn, is experiencing a considerable movement in research to identify and assess the research trends in COVID-19 literature. Table 1 represents tabular literature summaries of bibliometric research on COVID-19.

A review of global trends in COVID-19 research from the bibliometric perspective reveals main thematic areas: complementary research in virus and coronavirus and identifying virus and coronavirus types and strains. These thematic areas will mainly support subject areas such as virology, veterinary sciences, biochemistry, molecular biology, immunology, infectious diseases, pharmacology, general medicine, and public health.¹

According to Ruiz-Real, Nieves-Soriano, and Uribe-Toril^[11] research on COVID-19 has gone beyond the health sciences studies and other scopes (e.g., social sciences, technology, art and humanities) have accounted for important shares of this research field. Bibliometric analyses of COVID-19 related research in social sciences area indicated that the challenges of the tourism and transportation industries during the pandemic have received particular attention.^[16,17,24] Economic, business, and management crises have also been among the most interesting topics in the scientometric analysis of COVID-19 related literature.^[19-21] Furthermore, hidden and apparent fears, anxiety and distress related to the pandemic also appeared in the literature.^[22,25-27] In this sense, infodemic information demonstrated that anxiety and depression were more prevalent among people who have been more exposed to the pandemic news on social media.^[26] However, some evidence suggests that the level of psychological distress reduced by prolonging the pandemic period.^[26] Also, gender differences in public feedbacks regarding the pandemic has been confirmed.^[28-29] More importantly, there is always a level of questionable and unreliable information shared by people on social media.^[30]

Generally, considering the literature review (Table 1) in can be said that, the number of bibliometric research with special focus on co-word and cluster analysis which assess the research trends of COVID-19 literature in the field of social sciences are scarce. It seems that it is necessary to conduct research using co-word analysis in non-health scientific areas such as social sciences in order to:

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Table 1: Literature review of bibliometric research on COVID-19.

Author/ Date	Main subject	Conclusions
<ul style="list-style-type: none"> - Herrera-viedma <i>et al.</i>^[2] - Zhang <i>et al.</i>^[3] - Andersen, Bramness and Olea lund^[4] - Fan <i>et al.</i>^[5] - Furstenua <i>et al.</i>^[6] - Homolak, Kodvanj and Virag^[7] - Okhovati, and Arshadi^[8] - Costa <i>et al.</i>^[9] - Sahoo, Pandey^[10] - Zhang and Shaw^[3] - Ruiz-Real, Nieves-Soriano, and Uribe-Toril^[11] 	<ul style="list-style-type: none"> - Bibliometric analysis of COVID-19 researches generally 	<ul style="list-style-type: none"> - Main thematic areas: - Virus and coronavirus complementary research, - Virus and coronavirus type and strains, - Health and pandemic management, - The disease and its parasitology, - Clinical epidemiology of the disease, - Treatment of the disease - Damage prevention and containment of COVID-19 - Comorbidities and diseases caused by COVID-19 - Travel cancellation - Evidence-based Recommendation - Middle East respiratory syndrome corona-virus - Public health - Quantitative detection
<ul style="list-style-type: none"> - Nasir <i>et al.</i>^[12] - Shaukat <i>et al.</i>^[13] - Aristovnik, Ravselj and Umek^[14] - Singh and Verma^[15] 	<ul style="list-style-type: none"> - Bibliometric analysis of COVID-19 research in Social sciences 	<ul style="list-style-type: none"> - Main themes: - Social and economic effects of epidemic disease, Infectious disease, calamities and control, outbreak of COVID 19, Infectious diseases and the role of international organizations, social sciences and humanities, psychology, business, management, economics, finance, sociology and political science, clinical psychology, planning and development, social psychology, education, political science and international relations, public health, disease control, and tourism, economics, and risk management.
<ul style="list-style-type: none"> - Shao <i>et al.</i>^[16] - Li <i>et al.</i>^[17] - Siagla^[18] - Tanriverdi, bakir and Merkert - Verma and Gustafsson^[19] - Bauwens, <i>et al.</i>^[20] - Mahi <i>et al.</i>^[21] 	<ul style="list-style-type: none"> - Bibliometric analysis of COVID-19 research in Tourism, management, business, and economics fields 	<ul style="list-style-type: none"> - Main themes: - Tourist decision-making, destination marketing, technology adoption, the future of tourism post COVID-19, the COVID-19's impacts on tourism and hospitality stakeholders, departmental management, economic growth, demand, income, risk, and Economic issues.
<ul style="list-style-type: none"> - Nawaz, Anum Saeed, aslam Sajeel^[22] 	<ul style="list-style-type: none"> - Psychology 	<ul style="list-style-type: none"> - Main themes: - Mental health, anxiety, trauma, depression, stress, PTSD
<ul style="list-style-type: none"> - Baber <i>et al.</i>^[23] 	<ul style="list-style-type: none"> - Digital literacy 	<ul style="list-style-type: none"> - Main themes: - Fake new, competence, educational Technology, health literacy, self-Efficacy, higher education, and social media and information literacy.

- Mapping the conceptual structure of COVID-19 literature in the social sciences area based on the cohesion measures, and
- Identifying central and emerging thematic clusters of COVID-19 literature in the social sciences area based on co-word analysis.

Thus, the present study was conducted to reach a semantic structure and to evaluate non-health scientific areas regarding to the COVID-19 pandemic. In co-word analysis, it is assumed that the most frequent words have a greater impact on a domain. Also, such analysis allowed us to reveal the developed clusters as well as emerging clusters in order to predict the direction of future research. In this regard, the

research workflow including methodology, data collection, process and analytical techniques were demonstrated in Table 2.

RESULTS AND DISCUSSION

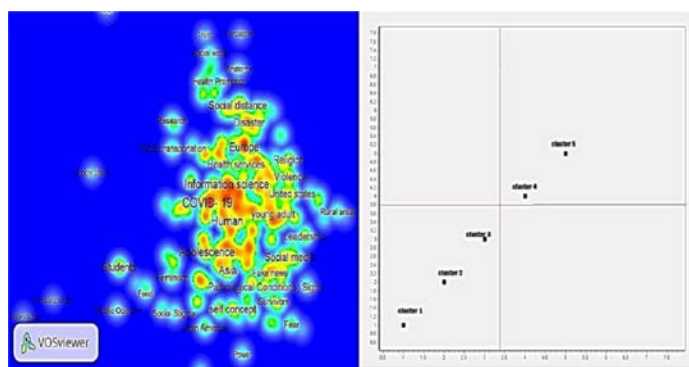
Network Cohesion

Network clustering coefficient and density

Network clustering coefficient was introduced by Watts and Strogatz^[31] and it is the average clustering coefficient of all keywords in the network.^[32] In the present study, the network clustering coefficient of the research network was 6.62 that means an average of 6.5 keywords are concentrated around each keyword (Figure 1). Also, the average distance between network nodes was 1.64 indicating a close distance between the nodes (descriptors/keywords). The network had 179 nodes with 20532 links representing its high level of cohesion.

Table 2: Workflow of the research.

Data retrieval	<ul style="list-style-type: none"> •Scopus database •Search strategy in title, subject, and keywords fields: "Corona virus", "Coronavirus", "COVID-19", "2019-nCoV", "SARS-COV", "MERS-COV", "Severe acute respiratory syndrome", "Middle east respiratory syndrome" •Results limited to "Social sciences area" using the "subject area" filter. •Total number of documents retrieved: 2587 documents in year 2020
Pre-processing	<ul style="list-style-type: none"> •Scopus.exe used to extract the keywords file: kw.dbf (Available at https://www.leydesdorff.net/scopus/) •Data standardization and codification methods: <ul style="list-style-type: none"> •break-cull method, •Medical Subject Heading (MeSH) •179 final descriptors extracted using Microsoft Excel
Co-word analysis	<ul style="list-style-type: none"> •Co-occurrence matrix generated by use of BajiMacro (Available from http://www.analytictech.com/products.htm) used for network integrity, and cluster analysis
mapping and visualization	<ul style="list-style-type: none"> •clusters visualized by use of: <ul style="list-style-type: none"> •strategic diagram in Ucinet 6 software •cluster map in VOSviewer software

**Figure 1:** Strategic diagram of the research clusters and link strength map of the keywords network.

Furthermore, the connectedness of a network is determined through density measurement, which is the ratio of the power of all nodes to display the number of possible connections. Thus, the higher the density, the greater the cohesiveness within the network.^[32] In the current research, the network density was 0.33 suggesting 33% of all possible connections in the network were displayed.

Network clustering and mapping

Network clustering of the research data was performed by applying correlation method with a fit of 0.257 in UCINET software. Based on the similarities and the cohesion of the keywords, five clusters were identified. Table 3 demonstrated the details of each cluster including the main themes, sub-themes and the keywords.

Briefly, according to the data (Table 3), the main themes raised in the research clusters were: environmental issues, social quality service, crisis management, social support, and COVID-19 social effects. To identify the central and emerging themes, strategic diagram of the clusters was drawn using

UCINET software and keywords with highest frequencies and link strength mapped in VOSviewer (Figure 1).

The strategic diagram illustrated the centrality and density of each thematic cluster (Figure 1). In general, the higher the centrality of a thematic cluster, the more significant that cluster is. In addition, the higher the density of a thematic cluster, the more mature and developed that cluster is. The clusters located at the top right of the diagram have a high centrality and density so they are the most mature and developed clusters of the research area. The clusters at the top left of the diagram are not central but are somewhat developed. The clusters at the bottom left are marginal and insignificant, while the clusters at the bottom right, although central, are developing and emerging.^[33] Therefore, according to the Figure 1, cluster 4 and 5 were the most significant and central clusters of COVID-19 literature in the social sciences area. It is obvious that these clusters contain the highest frequency keywords and cover topics related to the onset of the pandemic, such as health control, quality of life, social rights, and the limitations and social effects of the pandemic, such as psychology, financial issues, and education. In this regard, Chaturvedi *et al.*^[34] findings indicated that the Covid-19 pandemic had a significant impact on the mental health, education, and daily routine of students. Also, other research reported that fear, and anxiety distress are significant psychological effects of COVID-19 pandemics.^[25-26] On the other hand, Malhotra^[35] reported that unemployment occurred in many sectors of the society because of the enforced lockdown that consequently resulted in anxiety and obsessive behaviour.

According to the Figure 1, thematic clusters of 1 to 3 were also central but emerging and still developing mainly due to the small number of the keywords in these clusters. Also, the thematic content of these clusters showed since the beginning of the pandemic the initial fears and limitations decreased and the researchers have also turned their attention to the other critical effects such as environment, climate change, and vulnerable populations. But, themes such as health care services, social welfare, and crisis management were still among the central themes. It is interesting that in cluster 3 (Table 3) research themes such as coping behaviour, crime, loneliness, mental disorder, posttraumatic stress disorder, solidarity, suicide, violence, and mortality were among the emerging topics suggesting research in the field of psychology was shifting to the long-term psychological effects of this pandemic. Moreover, the results of the current study suggested that topics related to social life such as mass media, social behaviour, and social media during the pandemic were the interesting subjects to the researchers in the area of social sciences, especially those in the field of psychology. In this regard, Nawaz and Sajeel^[22] believe that people who were more exposed to COVID-19 news on social media were

Table 3: Network clustering analysis based on themes and sub-themes.

Cluster 1	Themes	Sub themes	Keywords
		Environmental issues	Environment Health control
Cluster 2	Social Quality service	Health care services	Evidence based practice, emergencies, diseases, patient perception, personnel management, prevention, protective clothing, severe acute respiratory syndrome, therapeutics, vaccines
		Quality of life	Health behavior, planning, power, public opinion, quality of life, sentiment, sleep, smart city, social identity, social welfare, strategy, supply chain, depression
		Research	Priority journal, professionalism, reproducibility of results, research, mathematical concepts
		Regions and age groups	Child, china, vulnerable populations
Cluster 3	Crisis management	Regions and Age groups	Latin America, male, female, emigrants and immigration
		Social welfare	Democracy, globalization, industry, management, media, fake news, risk, safety, public transportation, social support, school
		Clinical psychology	Coping behavior, crime, loneliness, mental disorder, posttraumatic stress disorder, solidarity, suicide, violence, mortality
		Health care	Disease control, animals, global health, world health organization, health literacy, procedures
Cluster 4	Social support	Community health management	Anatomy, biology, health, health personnel, health promotion, health risks, hospital, nursing, therapeutics, veterinary, sexual behavior
		Social rights and limitations	Human rights, lockdowns, management, organization, poverty, quarantine, social stigma, social support, social works, systems, war, intersectionality, trust, ethics, food
		Regions and age groups	Africa, Canada, developing countries, disabled persons, aging, refugees,
Cluster 5	COVID-19 Social effects	Psychology	Adaptation, behavior, mental health, self-concept, stress, trauma, psychiatry, psychology, social behavior
		Covid-19 (medicine)	Covid-19 pandemics, chemicals and drugs, epidemics, epidemiology, health behavior, health care, health service, infection control, infections, pandemics, pathological conditions, signs and symptoms, pneumonia, viral policy, public health, virus diseases, virus pneumonia, viruses, personnel management
		Regions and age groups	Adolescence, aged, Asia, Australia, Europe, united states, young adults
		Technology	Telemedicine, technology, internet, social media, information science, Communication
		Business and management	Business, economics, employment, financial crisis, government, politics, organization and management, leadership
		Education	Academic institutions, education, students
	Social activities	Family, human, human activities, humanities, mass media, religion, sociology, tourism, social discrimination, social distance, social isolation, social sciences, sports	

more prone to depression. Furthermore, it was confirmed that fake news during the pandemic could affect people's mental health^[30] as also indicated in the present study.

CONCLUSION

Overall, the findings of the present research indicated the COVID-19 pandemic could affect particular aspects of human social and individual life, as it was reflected in the social sciences research on COVID-19. Also, the attention to non-health scientific disciplines in research on COVID-19 had increasing trend. In addition, our results revealed that emerging thematic clusters contain topics such as climate change, environment,

vulnerable populations, culture, and quality of life, fake news, and social identity. Therefore, the findings of the current study suggested that in separate research, the conceptual structure and research trends related to the above-mentioned fields should be investigated separately by using bibliometric methods; so as to benefit not only the scientific community but also policymaking as part of effort to properly respond to COVID-19 pandemic. The present study also predicted that at the end of the COVID-19 pandemic, its social effects on societies could be consistent; thus, it is recommended that research on COVID-19 effects in the area of social sciences in universities and research institutions should be reconsidered.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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