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Research Article

COVID-19, Misinformation and Communication Studies: A Systematic Review of the Infodemic

COVID-19, Yanlış Bilgi ve İletişim Çalışmaları: İnfodemi Üzerine Sistematik Bir Gözden Geçirme

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ABSTRACT

This study aims to structure the available body of knowledge relating to the infodemic by means of a systematic review and explore it in a multidimensional manner by taking into account the speed of the propagation of misinformation, its fast-changing nature and effects. The study also aims to present the interaction between the field of communication and other fields of study within the framework of the ongoing infodemic. The studies for systematic review were gathered from internationally known scientific databases, namely the Web of Science Core Collection and Google Scholar, over two stages. A total of 46 studies were included in this systematic review. This study utilized an inductive research approach for systematic review. Using this approach, the authors' identified the reasons for the propagation of misinformation during the COVID-19 pandemic in these papers. The authors also identified the effects of this misinformation, the methods of individuals, official and non-official actors to combat misinformation, the cultural factors and legal measures for combating misinformation, and the recommendations related to traditional media, the new media and other verification structures. The studies conducted in the field of communication were predominantly cited in studies conducted within Communication and Health & Health Care Sciences fields. A notable observation made in this study was that studies which focused on combating misinformation were cited more than other studies reviewed.

Keywords: COVID-19, infodemic, misinformation, social media, systematic review

ÖZ

Bu çalışma COVID-19 salgınında yanlış bilginin yayılma hızını, hızlı dönüşen yapısını ve etkilerini göz önünde bulundurarak; bir sistematik gözden geçirme aracılığıyla infodemiye yönelik bilgi birikimini yapılandırmayı ve onu çok boyutlu

bir şekilde keşfetmeyi amaçlamaktadır. Ayrıca, infodemi konusu çerçevesinde iletişim disiplini ve diğer disiplinlerin etkileşimini ortaya koymak çalışmanın amaçları arasındadır. Bu çalışma kapsamında değerlendirilen araştırmalar, sistematik gözden geçirmeye dahil etmek üzere uluslararası ölçekte tanınan bilimsel veritabanları Web of Science Core Collection ve Google Scholar'da iki aşamalı bir süreç ile aranmış ve 46 çalışma sistematik gözden geçirmeye dahil edilmiştir. Tümevarımcı bir araştırma perspektifiyle gerçekleştirilen sistematik gözden geçirme sonucunda COVID-19 salgını sürecinde yanlış bilgiyi ortaya çıkaran sebepler ve etkileri; bireysel, resmi ve gayrı-resmi aktörlerin yanlış bilgi ile mücadele yöntemleri; yanlış bilgi ile mücadelede kültürel faktörler; yasal önlemler ve geleneksel medya, yeni medya ve diğer doğrulama oluşumlarına yönelik tavsiyeler elde edilmiştir. İletişim alanında gerçekleştirilen bilimsel çalışmalara en çok İletişim ve Sağlık Bilimleri alanlarında yapılan bilimsel çalışmalarda atıf yapıldığı gözlemlenmiştir. Yanlış bilgi ile mücadele konusu ana odak noktası olan iletişim çalışmalarının farklı alanlardaki araştırmalar tarafından sistematik gözden geçirmedeki diğer çalışmalara kıyasla daha fazla alıntılandığı gözlemlenmiştir.

Anahtar Kelimeler: COVID-19, infodemi, yanlış bilgi, sosyal medya, sistematik gözden geçirme

INTRODUCTION

Misinformation presents an immense source of danger for the ecosystem of new media. The concept of 'intent' is important in the categorization of misinformation (Nemr & Gangmare, 2019; Patel et al., 2020). Misinformation occurs in cases where there is no intent. It may result from an honest mistake, negligence, or unconscious bias (Fallis, 2014). Disinformation, which is referred to as the distortion of information, is created by fictionalizing an unreliable content in a realistic way. It refers to false facts which are intentionally designed to mislead and deceive an audience (Fetzer, 2004; Kumar, West & Loscovec, 2016). The speed of the dissemination of knowledge and information on social networks also adds to the propagation speed and power of disinformation (Figueira & Oliveria, 2017, p. 818).

Crisis periods enormously increase the need for information (Binark et al., 2022, p. 27). Various studies show that social media can be used as a platform to share crisis information and realize digital volunteerism in times of crises (Starbird & Palen, 2011; Whittaker, Handmer & McLennan, 2015, Huang et al., 2015). Information on social media, however, has a fast-flowing nature and this information rarely passes through the control of gatekeepers. Pine et al. (2021) note that "Risk information acquired from social media is often beset with information quality issues, including uncertainty, ambiguity, and conflicts between information." Starbird (2020) claims that information gaps may emerge in times of crises and this ambiguity may increase anxiety. Starbird

argues that individuals may use information found on social media to better understand or make sense of a crisis. This process may transform into a collective process of sense-making as a natural human reaction of response to a crisis, thereby creating false rumors. This means that a valuable tool for tackling a crisis cannot be used effectively. Kim et al. (2020) observe that misinformation adversely affects an individual's desire for further information. In this way, it is possible to better understand how an abundance of misinformation circulated via digital channels can make the situation more dangerous. A wave of misinformation only brings further challenges to the COVID-19 pandemic. The pandemic, with soaring rates of mortality and burdened health care systems across the world, has revealed how unprepared governments are for dealing with crises at a pandemic level, has pushed the economies to a state of ambiguity, has changed business and work processes, and has interrupted social life. This state of uncertainty, fear and danger has caused disinformation across digital channels (Patel et al., 2020).

The portmanteau 'infodemic' was popularized by the World Health Organization to describe the misinformation problem surrounding the COVID-19 pandemic. An infodemic is defined as the abundance of both accurate information and misinformation, which causes confusion and leads to a mistrust in governments and public health processes. (WHO, 2020). According to Alias (2020, p. 40) every pandemic is followed by an overwhelming flood of information. This information tsunami, which quickly spreads, includes not only accurate information, but also misleading information. The source of COVID-19, misleading and inaccurate statistics, infectivity and infection patterns, clinical presentation, diagnosis, preventive measures, treatment, and immunity and results/outputs (El-Gilany, 2020, p. 88) are some of the topics which have been addressed in the context of the COVID-19 infodemic. Prominent political leaders who share messages on social media platforms in order to address large numbers of people appear to be one of the sources of the COVID-19 infodemic. Many of these politicians have created an environment of ambiguity and concern through the influence they wield. In the early stages of the pandemic, President Jair Bolsonaro of Brazil described COVID-19 as a simple cold (Walsh, 2020). Similarly, Donald Trump, at the time President of the USA, told the American public "Do not fear Covid-19" (Kolata & Rabin, 2020). Bento et al. (2020) found that initial government announcements concerning the COVID-19 pandemic only briefly raised public attention. In this sense, the trivializing comments of public figures and authorities have the potential to further increase the dangers caused by the infodemic.

According to Cuan-Baltazar et al. (2020, p.7), misinformation was shared by the media regarding COVID-19. Moreover, users had access to this information. Inaccurate health information may reinforce the misconceptions about the virus and poses a serious risk to the public. The COVID infodemic has spread on a global scale through digital tools such as social networks, and smartphones. The infodemic means the public have difficulty accessing reliable resources and directives, which can adversely affect people psychologically and emotionally, and influence their decision-making processes (PAHO, 2000). This in turn can damage public trust, which is reinforced through transparent communication and accurate information, while the lack of accurate and reliable information may trigger frustration and confusion for the general public (Givas, 2020). Acknowledging the social harm that the infodemic would create, digital platforms developed different measures to prevent this, and issued a declaration stating that the digital platforms in question would act jointly on the matter (Facebook, 2020).

AIM AND METHODOLOGY

This study recognizes the increasing number of studies surrounding the infodemic and constant transformation of misinformation emerging during the COVID-19 pandemic, and aims to systemize and structure the existing information in order to develop reactive/proactive scientific solutions to address the problems created by the infodemic. Considering the overwhelming quantity of knowledge production in times of global crises, interdisciplinary approaches are of paramount importance. Within the framework of the COVID-19 pandemic, another purpose of this study is to enlighten the relationship between the field of communication and other research fields and to contribute to the field of communication in an interdisciplinary context. In addition, the study aims to develop the findings of the systematic review conducted by Ali (2020) on the subject of combating the ongoing COVID-19 misinformation.

The fact that previous systematic reviews have not acknowledged the interaction between communication sciences, which is directly associated with the concept of infodemic, with other branches of science creates a research gap at this point. There are three functional outputs of exploring the relationship between other research fields and the field of communication sciences: 1) determining the areas where communication studies can contribute to other research fields, 2) determining what types of information different disciplines might need that can be produced in the context of communication studies, and 3) being a guide for future studies concerning the infodemic.

Regarding the functional outputs of this study, the following research questions were designed:

RQ1. How can the main categories of knowledge produced in terms of the studies on the infodemic be illustrated?

RQ2. How do studies from different other fields interact with the studies from the field of communication in the context of the COVID-19 infodemic issue?

The approach suggested by Xiao and Watson (2019) was adopted for the systematic review. A research protocol was designed to increase the efficiency of the systematic review, a protocol by the researchers was established and thus bias was reduced. The protocol includes information about the aim of the research, research questions, research strategy, data collection, analysis, and reporting processes. For the purposes of increasing the external reliability of the process to be followed, researchers consulted the opinions of three researchers who had conducted studies on similar subjects.

According to Petticrew and Roberts, electronic databases constitute the predominant source of published literature collections (as cited in Xiao & Watson, 2019, p. 103). In this context, studies to be included in the systematic review were obtained from the Web of Science Core Collection and Google Scholar over a two-phase process. The Web of Science was selected since it allows field-specific and language-specific searches. Moreover, the website provides a base that allows for a preliminary search as well as access to quality articles from the field of communication. Similarly, Google Scholar allows for the determination of secondary studies which cite the primary studies found on the Web of Science Core Collection. It also provides the opportunity to access research indexed in various scientific databases.

Boolean operators and words were used when searching for data from the Web of Science Core Collection. A search was carried out for articles which contained the words 'COVID-19 – disinformation', 'COVID-19 – misinformation', 'COVID-19 - fake news', 'coronavirus – disinformation', 'coronavirus – misinformation', 'coronavirus - fake news', 'infodemic' in their title. The searches were limited to journals published in the field of communication and articles written in English. The search words 'COVID-19 – disinformation', 'COVID-19 – misinformation', 'COVID-19 - fake news' were used in the search on January 24, 2021, the word 'infodemic' was used for the search on January

31, 2021, and the words 'coronavirus – disinformation', 'coronavirus – misinformation', 'coronavirus - fake news' were used for the search on February 16, 2021. A total of 47 studies were obtained as a result of these searches. Among the studies collected as a result of these searches, 7 repetitive works, 13 studies in non-English, and 1 study, the full text of which could not be accessed, were identified. These studies were excluded, and the remaining 26 studies were collected. Within the scope of this study, these studies are referred to as 'Primary Studies'. The abstract of each primary study was read and included in the systematic review. In this process, as Xiao and Watson (2019) recommend, the conclusion was read and if the abstract did not provide sufficient details; in cases of doubt, the study was included in the analysis. The abstracts of the 26 studies were read by the two researchers, and each researcher expressed their opinion independently. As a result, the researchers decided to exclude 2 studies from the research. One of the studies excluded was an introductory article to a special issue of a journal. The other study, despite containing the word infodemic, provides a limited contribution for the purposes of this systematic review. As a result, 24 primary studies conducted on the infodemic in the field of communication were obtained.

Following this phase, a search for the 24 primary studies obtained from the Web of Sciences Core Collection was carried out on Google Scholar to determine their number of citations and which studies cited them. According to this search, which was performed without any limitation of field, it was found that the primary studies were cited in 88 studies on Google Scholar. The studies collected using the forward search were categorized as 'Secondary Studies'. In 88 secondary studies, 20 repetitive studies along with 11 studies, whose titles were determined to be in languages other than English using the Detectlanguage function provided by Google Sheets, were excluded from the dataset. The editorial policies of journals, in which the other 57 articles were published, were reviewed, and it was determined that 23 scientific studies had not been subject to a peer-review process or were non-compliant with the journal article format. The abstracts of the remaining 34 articles were reviewed by the two researchers and 22 articles, considered to have conformed with the analysis criteria, were included in the study. The process of inclusion and exclusion is illustrated in Table 1.

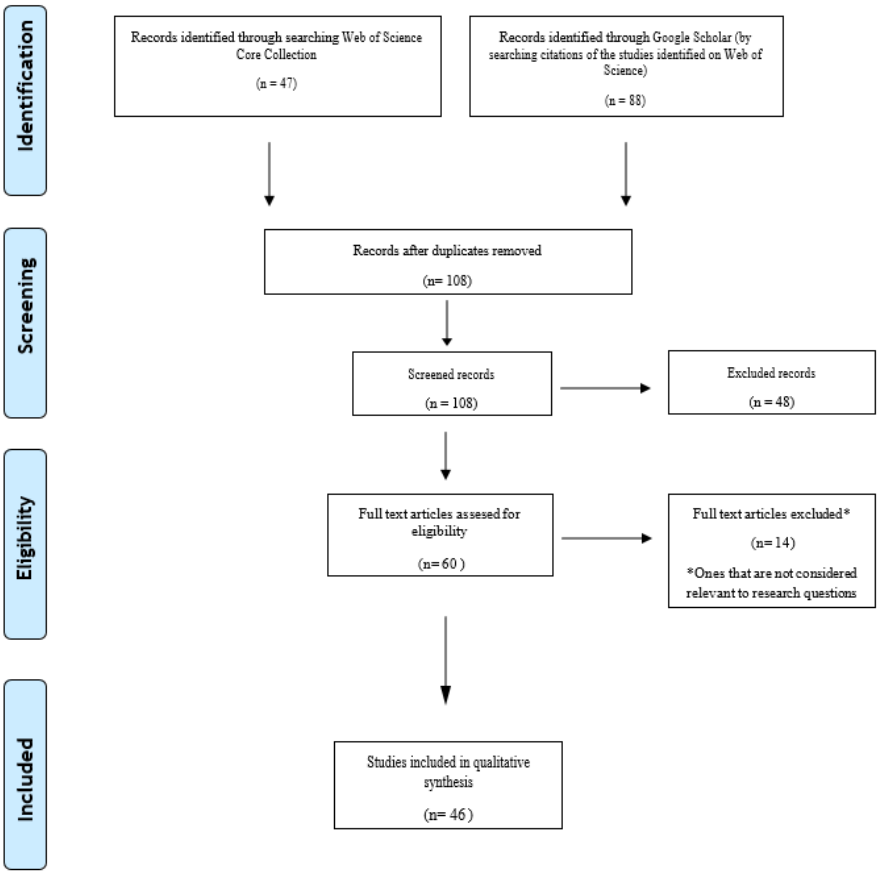

Figure 1: PRISMA Systematic review diagram of this study (designed based on Moher et. al, 2009)

The researchers reached a consensus to include 46 journal articles in the systematic review. The studies included in the systematic review for answering research questions were evenly divided between the researchers. In this process, the full texts, methodology, findings, discussion, and conclusion sections were read carefully using an inductive approach. The sections that contained answers to the prepared research questions were marked in each article and digital notes, accessible to both researchers, were taken. The scientific fields to which the articles belonged were determined by considering the categories available on the Web of Science. A code was assigned to each of the articles according to these categories (see Appendix 1 for abbreviations).

Table 1: Codes of field of research

Field of Research	Abbreviation on Citation Map
Communication	C
Health & Health Care Sciences	H
Information Management	IM
International Relations	IR
Library Science	LS
Psychology	P
Public Administration	PA
Political Science	PS

FINDINGS

The findings from each research question are presented in this section.

RQ1. How can the main categories of knowledge produced in terms of the studies on the infodemic be illustrated?

Causes of Misinformation

From the results of the review of the studies, factors such as low levels of public trust in government transparency and public institutions, low levels of public trust in scientists, high degrees of inconsistency between the opinions of experts, and a lack of trust in official sources were observed as reasons for much of the misinformation. Lovari (2020) suggests that individuals' lack of trust in public institutions and the politicization of facts surrounding COVID-19 reduce individuals' trust in scientific and health data. Nguyen & Nguyen (2020) note that the government and health authorities in Vietnam are insufficiently equipped to meet the public's information needs and that trust in government transparency is low. Nguyen & Nguyen (2020) and Elías & Catalan-Matamoros (2020) highlight the fact that citizens tend to follow alternative channels such as Facebook, YouTube and WhatsApp to share and receive information, which creates an environment in which misinformation flourishes. Falcone & Sapienza (2020) also note that those in the high risk group use social media, a far less trustworthy source of information, excessively.

Moreover, ambiguity and inconsistent information (Lovari, 2020) flow can be associated with misinformation. Lovari (2020, p. 459) claims that the way some health

professionals talk about the COVID-19 virus in their social media accounts and on mainstream media only increases public distrust. Furthermore, Lovari argues that this public distrust only further increases through the dissemination and politicization of discordant expert opinions on digital platforms and the way these expert opinions are associated with fake news and conspiracy theories. Nguyen & Nguyen (2020) draw attention to the ambiguous answers given by authorities. Pérez-Curiel & Velasco Molpeceres (2020, p. 74) also observed how the politicians they analyzed in their studies assume the role of producer and disseminator in the production of disinformation.

Elías & Catalan-Matamoros (2020) draw attention to the fact that public broadcasting organizations in Spain misuse language to minimize the reaction of the public and present a negative reality with positive metaphors (e.g., calling economic problems 'hibernation' rather than a 'crisis'). Moreover, organizations that broadcast "fake news" do not comply with the editorial norms and processes required to ensure the broadcasting of credible and reliable information (Duplaga, 2020). In some regions of the world, there are researchers who address the emergence of misinformation in the context of religion (see Alimardani & Elswah, 2020).

Factors That Cause Misinformation to Spread

Considering the existing studies on the subject, the technical structure of digital platforms (Li & Scott, 2020; Malhotra, 2020), interaction between users (Soto-Vasquez et al., 2020), and policies on the publication of scientific studies (Koerber, 2021) form a basis for the dissemination of misinformation.

Social media platforms and instant messaging services (IMS) used by individuals for communication and accessing information have allowed the misinformation to spread during the COVID-19 pandemic. Su (2021) observed that frequent use of social media is associated with a greater belief in misinformation. The fact that social networks create an echo chamber, and the way in which algorithms suggest content to users related to that user's areas of interest may cause the user to remain in this cycle after having been subjected to such content once (Li & Scott, 2020, p. 510). The visibility of such content is crucial for the dissemination of misinformation and for correcting it. Malhotra (2020) has analyzed the process in which misinformation starts to circulate in IMS and acknowledges that combating misinformation in these channels may be challenging due to the closed nature of these platforms. Pérez-Curiel & Velasco

Molpeceres (2020, p. 78) observed that politicians who share a hoax tend to mention other politicians. In this context, it is important to take the interactive nature of social media platforms into account. Tagging another user on a social media platform has the potential to increase interaction, while, at the same time, interaction has the potential to increase visibility. This creates the basis for misinformation surrounding COVID-19 to spread.

It has been emphasized that interpersonal relations make it possible for misinformation to spread. With this in mind, the concept 'chisme' mentioned in the study by Soto-Vasquez et al. (2020) is worth noting. Within the context of this study, the researchers conducted interviews with participants from the Latinx community. These participants characterized chisme as a tool for managing the process of meaning-making, and as an informal word-of-mouth and rumor-driven force (2020, p. 12). Chisme may assume a role for correcting the misinformation, and some participants of the study referred to the nature of chisme, which increases ambiguity, inconsistency and doubt (2020, p.14).

Koerber (2021) addresses science communication by discussing a preprint article as a case study. This preprint article claims that the virus was developed and spread as a result of genetic engineering studies in a laboratory environment. Koerber's study focuses on the conspiracy theories and discussions around this claim. Proponents of open science consider the fact that the information provided in articles published in pre-print format are open to the opinions of different researchers with the purpose of quickly identifying misinformation. It is suggested that those who approach the issue critically tend to support the conspiracy theories during the period before the article is withdrawn (2021, p. 24).

Effects of Misinformation in the COVID-19 Pandemic Process

Negative effects of the infodemic have been characterized in the context of such potential dangers as issues of trust (Carrapico & Farrand, 2020; Lovari, 2020; Atehortua & Patino, 2021) life-threatening public health problems (Radu, 2020; Patel et al., 2020; Malhotra, 2020), ambiguity, future anxiety, fear, stress, panic, and other psychological problems (Soldatova et al. 2020; Nguyen & Nguyen, 2020; Breakwell & Jaspal, 2020; Hornik et al., 2021; Sadeghzadeh et al., 2021; Shoaib & Abdullah, 2021; Duplaga & Grysztar, 2021) and polarization, hostility, and violation of rights (Al-zaman, 2020; Ali, 2020).

The anxiety, fear and panic created by the COVID-19 infodemic has led to irrational behavior such as the hoarding of food and other household products, administering COVID-19 treatments based on rumors, and discrimination towards people who live in COVID-19 hotspots (Nguyen & Nguyen, 2020). Misinformation has also led many people to take actions that are not recommended and also highly risky such as washing food products with bleacher and applying domestic cleaning products or disinfectants on bare skin (Kim et al., 2020, p. 587).

Lin claims that the infodemic has adversely affected the public's attention or interest and efforts to learn about the pandemic (2020, p. 663). Kim et al. (2020) are in agreement with Lin on this point. Kim et el. observe that people's desire for information decreases when they are subjected to misinformation, and that people who are provided accurate information tend to desire more information (2020, p. 606-607). Addressing the concept of infodemic within the framework of individual behavior, Arnot et al. (2020, p. 272) argue that our primary tool for preventing the spread of the disease is behavioural changes such as wearing masks and social distancing. They argue that misinformation and conspiracy theories are the most significant reasons for many people's refusal to adopt these behaviors.

The COVID-19 infodemic is sometimes instrumentalized. It is defined as a phenomenon that leads to the slandering of opponents with information that may prove to be inaccurate afterward, not assuming responsibility, creating distrust in the public, and creating political and social crises (Pérez-Curiel & Molpeceres, 2020, p. 77, 87; Gracía & Martínez, 2020). For instance, Patel et al. (2020), provide an example of disinformation through the misrepresentation of the number of COVID-19 cases in the Ukrainian army, and the excessive measures taken by the Ukrainian Government. This speaks to the potential for wider public distrust in governments when the government is deliberately portrayed as weak.

Individual Methods for Combating COVID-19 Misinformation

In light of the reviewed studies which discuss the fight against misinformation in terms of the legal decisions taken by countries (Rodrigues & Xu, 2020; Radu, 2020), the role of cultural differences in the process for tackling COVID-19 misinformation (Kim et al., 2020; Soto-Vásquez et al., 2020; Malhotra, 2020), the use of official and non-official channels (Soldatova et al., 2020, Lovari, 2020; Nguyen & Nguyen, 2020), and the steps

taken for protecting corporate and individual reputations (Bogomoletc & Lee, 2021; Li & Scott 2020) were observed. Vraga, Tully & Bode stress the need for media and science literacy in order to combat COVID-19 misinformation (2020). In addition, policies must be developed by media and fact-checking organizations to fight misinformation along with new types of information tools such as tweetorial (Graham, 2021; Pérez-Curiel & Molpeceres, 2020; Lin, 2020)

A discussion of the theoretical framework on media and science literacy for combating the effects of the infodemic is important in order to evaluate the concrete actions that can be taken in this context. For this reason, the opinions of Vraga, Tully & Bode (2020) are important. Vraga, Tully & Bode underline the fact that interventions transform the news literacy into behavioural changes and recommend making concrete recommendations for improving critical information processing, ensuring that sharing of quality information is considered normal and important, and the need to send news literacy messages frequently and in a repetitive manner (2020, p. 476). Their study also observes how individuals are encouraged to correct the misinformation and share accurate information by taking an active role in combating misinformation. This approach would thereby attach importance to increasing the spread of reliable information in the new media ecosystem. Since individuals are motivated to seek information in social networks to make sense of the situation they are in, it is important to remember Haman's hypothesis when reading the solution proposals by Vraga, Tully & Bode (2020) for increasing reliable information. Haman (2020, p. 2) emphasizes how individuals may often discuss and share what they have learnt from social networks such as Twitter with their family members or friends. Soldatova et al. (2020, p. 754) also notes how individuals tend to click the links which they consider trustworthy, clarifying, and important. Moreover, the possibility to link increases.

Methods for Official Actors to Combat Misinformation

Hornik et al. (2021, p. 13) suggest that hundreds of rumors related to coronavirus have spread from different platforms and that these rumors have increased and decreased over the course of time. In this context, the issue becomes one of determining which information must be corrected as well as which platforms are ideal for this purpose. With this in mind, it is important for official and non-official actors to assume responsibility in combating misinformation and building an online environment of reliable information. Official channels that have made an effort to combat

misinformation include ministries and governments. The Italian Ministry of Health has organized campaigns on its official Facebook page with the participation of famous digital influencers and has shared posts that utilize hashtags, emoticons, and infographics. In addition, they have encouraged the participation of external stakeholders in the process and have brought many COVID-19 hoaxes to the public's attention (Lovari, 2020, p. 460). Nguyen & Nguyen (2020, p. 4469) have discussed the methods used by the Vietnamese government to combat misinformation. In the same study, Nguyen & Nguyen identified that information related to COVID-19 cases are shared on websites, mainstream media and social media, outdoor posters, television trailers and even dancing performances in order to prevent the spread of the virus. It is also stated that a popular song, famous on a global scale (4.4 million views on YouTube), was shared by the Vietnamese Ministry of Health to combat COVID-19. These efforts by official institutions suggest the importance of working with the new media culture of today and the types of content developed through this new media. The effect being that the culture created by these platforms along with the opportunities to cooperate through these platforms are used in the context of the combat against the infodemic.

Methods for Non-Official Actors to Combat Misinformation

Non-official actors have also assumed responsibility in an effort to combat the infodemic. Non-official sources of information include brands, individuals, voluntary groups, and experts who do not have official public connections. Nguyen & Nguyen (2020, p. 446) discuss the efforts of voluntary fact-checking groups in combating misinformation on Facebook and YouTube in Vietnam. Nguyen & Nguyen note that these fact-checking groups quickly gained followers and the public was introduced to the concept of infodemic. Similarly, Bogomoletc & Lee (2021, pp. 121-122) discuss how a brand combated misinformation within the scope of their corporate communication activities. Bogomoletc and Lee note the public's surprise at a steak brand assuming the role of media literacy educator. The public showed their appreciation for this (an increase in the number of followers for this brand) and draws attention to the fact that the combat against the COVID -19 infodemic may be an important area of social responsibility that increases the target audience of the brand. Alongside this, the combat against the COVID infodemic was also addressed with regard to its potential in harming celebrities reputations (for instance, rumors about the Chinese footballer Wu Lei), In this context, the efforts of celebrities to dispel any rumors through their

own social media accounts and through a reliable source of traditional media was conveyed (Li & Scott, 2020, p.511).

Cultural Factors in the Combat Against Misinformation

Soto-Vasquez et al. (2020) studied the Latinx community's approaches towards combating misinformation and observed how familial media ecology plays a role in correcting this misinformation (2020, p. 7). In this study, Soto-Vasquez et al. observe how misinformation correctional behaviour takes place through interpersonal relations and IMS (2020, p. 8) and how the information flow within the community comes into play in the process of obtaining information. In this context, Facebook pages and the suggestions of family members who have medical knowledge are used. Their study reveals the doubts about information obtained from social media and suggests that social media is not the main source of information on COVID-19, rather it is a supportive source (2020, p. 10, 11). Malhotra (2020) draws attention to the way that cultural conditions may become an important factor in the process of correcting misinformation. Malhotra argues that interpersonal relationships have become more important in correcting this misinformation in IMS (2020, p. 2). Their study also notes that correcting misinformation from old men in hierarchical family structures, where gender and age are important, may require a different strategy different from correcting information put into circulation by a friend (2020, p. 3). In this context, it is observed that an ecosystem, which makes it possible to correct misinformation at an interpersonal level within the family or the community, emerges and the internal dynamics of this ecosystem directly affects this process. Similarly, Kim et al. (2020) argue that cultural differences must be taken into account in risk communication. They suggest that individuals in high-uncertainty avoidance cultures may show less tolerance to information ambiguity and changes in health advice and guidelines during the pandemic. For this reason, Kim et al. conclude that clear, consistent risk communication and formal governing structures could be useful for addressing uncertainty in high-uncertainty avoidance cultures (2020, p. 609).

Legal Measures to Combat Misinformation

Rodrigues & Xu (2020, p. 127-128) argue that the existence of an effective 'anti-online-rumor' structure allows China to be better prepared for combating fake news in this global pandemic. Rodrigues and Xu point to the capacity of local authorities to combat misinformation, as well as the measures taken by Chinese social networks to

prevent the spread of misinformation. In addition, Rodrigues & Xu (2020) and Radu (2020) note how the Indian Government prepared and issued advisory on platforms such as Facebook, Twitter, ShareCat and WhatsApp as a means to combat COVID-19 misinformation. Radu (2020, p. 3), however, warns that restricting access to information, criminalizing critical and 'unpatriotic' posts and imposing fast AI-driven content removal procedures will have a harmful effect on the public's ability to make a distinction between inaccurate and accurate information.

Advice for Traditional Media, New Media and Other Verification Bodies

Lovari (2020, p. 460) argues that in emergencies institutions should depoliticize health-related issues on social networks in order to reduce the already existing polarization resulting from social media's use of algorithms. Nguyen & Nguyen (2020, p. 446) highlighted the fact that social media companies are not paying sufficient attention to how users are publishing factually correct but substantially untrue content on their platforms. Pérez-Curiel & Molpeceres (2020, p. 87) noted that fact-checking institutions and platforms only state that the news is fake but fail to provide any information as to why it is fake. They stress the need for these fact-checking websites to provide clear and accurate explanations for why news is labelled fake. Lin (2020, p. 665) draws attention to the need for media organizations to put aside their business purposes and assume responsibility. Lin stresses the need for these media organizations to separate public health and politics and put a stop to discourse that reduces public trust. Harmatiy (2020) underlines the fact that reliable media content will increase news literacy and scientific literacy as well as how scientists must present their output in an accessible way by enriching them with complementary images (e.g., infographics, video, maps).

RQ2. How do studies from other fields interact with studies from the field of communication in the context of the COVID-19 infodemic?

The authors observed that communication studies were predominantly cited in the Communication field and Health & Health Care Sciences field. Since the COVID-19 infodemic is a phenomenon that has emerged at the intersection of misinformation and a large-scale health crisis, the interaction between the fields of communication and health is not an unexpected result. However, determining the specific subjects from different fields which may interact with communication studies makes it possible

to determine what information different fields need that is produced as a result of communication studies.

As far as the references to the primary studies in the secondary studies conducted in communication field are concerned, it is observed that the suggestion made by Vraga, Tully & Bode (2020) about the need to develop an understanding to combat misinformation is frequently mentioned. As a result of the systematic review, it was understood that secondary studies make use of the primary studies for findings related to the harmful effects of the dissemination of misinformation during the COVID-19 pandemic. We also observed that studies conducted across different countries made references to similar problems or similar research topics.

The second field with the most citations to the primary studies is Health & Health Care Sciences. When references to the primary studies in the secondary studies conducted in this field were reviewed, it was observed that recommendations developed in the context of media literacy for combating misinformation and the topic of health literacy were mentioned. References include recommendations for journalists to minimize the dissemination of misinformation in news production processes, and the steps taken by the Italian Ministry of Health to prevent the spread of misinformation. Articles in the field of Health & Health Care Sciences made use of communication studies with regard to the conceptual and practical aspects of the combat against COVID-19 misinformation. The interaction between different scientific fields is visualized in Figure 1.

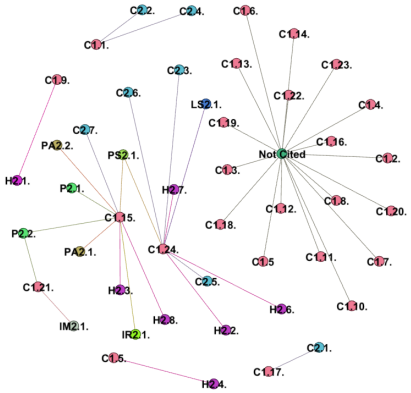

Figure 2: Citation map based on the field of studies. (Studies starting with '2' refer to Secondary Studies.)

Within the scope of the studies included in the systematic review, 'Spreading (Dis) Trust: Covid-19 misinformation and government intervention in Italy' written by Lovari

(2020) and 'Empowering users to respond to misinformation about Covid-19' written by Vraga, Tully & Bode (2020) were the articles with the most citations. Both studies address the topic of combat against misinformation in detail.

Considering the aspects cited from the primary studies in the secondary studies and the most cited primary articles, it would not be wrong to argue that the field of communication and other research fields need conceptual and practical advice in order to combat COVID-19 misinformation. Based on the citation pattern, communication studies on topics related to the results of misinformation on a regional scale and combat against misinformation are crucial when making comparisons between countries and sharing experiences.

DISCUSSION AND CONCLUSION

The results of our systematic review suggest that the infodemic has undermined global efforts to fight the COVID-19 pandemic. In his findings, Ali (2020) points to the fact that social media has played an active role in the spread of the COVID-19 infodemic. A total of 46 studies analyzed in the context of this study included results which are in line with Ali's finding. This is a positive and means that specific problems may be identified, and that new solutions to these problems may be developed. To date, the COVID-19 infodemic has largely been analyzed in the context of posts shared on social media and the studies reviewed point to how the infodemic has spread through interpersonal relations, communities and IMS. These studies argue that culture and interpersonal communication norms are significant parameters in the emergence of the COVID-19 infodemic and the fight against this infodemic. In this context, changes in understanding, which take the cultural variables both in the conceptual aspect and within the framework of crisis and risk communication, must be adopted to effectively combat this infodemic. In this framework, Soto-Vásquez et al. (2020) suggest that cultural and local differences must be taken into account for correcting the flow of misinformation by developing solutions beyond the literature provided by USA centered and White literature in the combat against misinformation and its propagation. In addition, Malhotra (2020) emphasizes how cultural components of interpersonal communication theories will enrich our understanding in the context of combating misinformation.

It is also possible to make recommendations on research designs to combat misinformation that spreads through IMS. The majority of the studies included in the

scope of this study's systematic review included discussions and quantitative approaches that take into account the previous literature. In the studies reviewed, the number of studies conducted using a qualitative approach was limited. This suggests that qualitative research designs, which allow for the obtaining of individual, community-specific and cultural insights in the context of COVID-19 misinformation, are needed. Studies conducted by various researchers such as Malhotra (2020) and Soto-Vasquez et al. (2020) also suggest that IMS can mediate the circulation and dissemination of the COVID-19 infodemic. Messages sent through these services are not public by their nature. In such a framework, in-depth interviews and focus group studies can bring greater attention to people's motivation to share information using IMS. More detailed information can be produced on how to combat misinformation in these channels and what corrections can be made.

Putting emphasis on the importance of critical thinking to combat misinformation, Pérez-Curiel & Molpeceres (2020) recommend seeking proofs and refraining from sharing information before its truth value is proven. Accordingly, it can be suggested that while developing a policy to combat the infodemic, decisions must be taken to educate large masses of people on digital literacy. In addition to legal decisions to combat the infodemic, in line with the recommendations of Vraga, Tully & Bode (2020), the development of policies on how to develop digital-distance education solutions that will increase the news and science literacy of all segments of the public should be considered. Therefore, in order to better understand the significance of the problems produced by the COVID-19 infodemic it is necessary to ensure the participation of large masses of the public. In doing so, the public may participate in digital learning and thereby become more aware of misinformation surrounding the COVID-19 pandemic.

It is observed that, in some cases, the spread of misinformation concerning the COVID-19 pandemic becomes instrumental for achieving various social or political goals (see Patel et al., 2020), and sometimes misinformation emerges without any specific goal. In this context, it is important that in future studies researchers conduct more detailed studies on instrumentalized disinformation.

It is observed that misinformation is frequently mentioned in discussions about the pandemic. In this context, Falcone & Sapienza's (2020) caution how "Getting more information does not mean becoming more knowledgeable." Studies which were included in the systematic review in line their finding and the World Health Organization's

definition of "infodemic" refer to cases that suggest that not only misinformation, but also information cacophony adversely affects health communication. The speeches of health professionals on social media and television (Lovari, 2020) or the confusing responses of public authorities (Nguyen & Nguyen, 2020) are issues that should be considered, and their affects must be measured in different countries. In this regard, it is important to conduct studies on how the state of dissemination of information free of the gatekeeper introduced by digitalization, and information presented in mainstream media in the context of health debates affect the risk management and communication process related to public health, even if such information is considered to be true.

The reviewed studies suggest that misinformation has the potential to harm the image and reputation on both an individual (Li & Scott, 2020) and corporate level. While the COVID-19 infodemic is a serious threat to public health, it also has the ability to damage intangible values such as individual and corporate brands. Some examples suggest that the combat against the infodemic has become an area of social responsibility through which brands can create added value (Bogomoletc & Lee, 2021). Case studies should be diversified to better understand how the infodemic can create both dangers and opportunities for individual and corporate brands, and the implications this creates economically. Future studies must discuss the roles that can be assumed by companies in the combat against the COVID-19 infodemic on a social and corporate level, the reactions that must be developed in the event of a misinformation crisis, or to what extent current crisis communication strategies addressing the pandemic can be functional in the context of corporate communication and crisis.

Although the studies analyzed in this research were chosen with careful consideration, they represent only a certain number of studies in the relevant literature. As the COVID-19 pandemic is ongoing, more studies must be included into the scope of future studies for developing the perspectives on the infodemic. Although this study has categorized the channels through which the COVID-19 infodemic spreads according to its nature (e.g., Social platforms, IMS), it is important that future studies review platform-specific research posited under these categories (e.g., those comparing the dissemination of the infodemic on Facebook and Twitter). This study has also been limited to studies written in English. A review of academic literature written in other languages is crucial for an understanding of country-specific experiences.

ENDNOTES

1 During the search phase of this systematic review, the authors of this article have not encountered any article written in English published on any WoS indexed journals based in Turkey that focus on the field of communications.

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