Review Article

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Fake news during the pandemic times: A Systematic Literature Review using PRISMA

https://doi.org/10.1515/opis-2022-0131
received February 26, 2021; accepted March 29, 2022.

Abstract: The purpose of this systematic literature review is to review the major studies about misinformation and fake news during COVID-19 on social media. A total of 144 articles studies were retrieved from ScienceDirect, Scopus, and Web of Science databases and 20 relevant articles were selected using the PRISMA technique. It was found that altruism, instant news sharing, self-promotion, and socialization are predictors of fake news sharing. Furthermore, the human mind plays a significant role in spreading misinformation while the role of critical thinking of individuals is very much important in controlling the flow of misinformation.

Keywords: COVID-19; fake news; misinformation; social media; rumors.

1 Introduction

The catastrophic events were seen as having sudden and unpredictable behavior. The novel Coronavirus (COVID-19) broke out in Wuhan city of China in late 2019 and astonishingly blown out globally. The coronavirus is not very dangerous itself, but the fear of virus is dangerous and the actual stigma is noticed among the people since its inception (Aslam, Awan, Syed, Kashif, & Parveen, 2020). The impact of coronavirus is not just limited to human health, but it also has a huge impact on other perspectives of life (Awan & Maqsood, 2021; Khan, Fatima, Ramayah, Awan, & Kayani, 2021). From the outbreak of this disease, global anxieties, rumors and misinformation also emerged (Atlani-Duault, Ward, Roy, Morin, & Wilson, 2020). After the initial outbreak of COVID-19 in China, many of the countries sealed their border which causes panic among people who were outside their countries(Haq & Awan, 2020). The fear and anxiety of this virus was not just limited to some individuals, but it had a significant effect all over the globe. Public concerns about the COVID-19 in some places have led to a mass purchasing of supplies like personal protective equipment which actually limit the supply of essential supplies for health care workers (Basch et al., 2020). The initial outbreak of COVID-19 results in vast coverage on social media about the COVID-19 disease which ultimately results in panic purchases of consumer items such as soaps, hand sanitizer, and toilet paper created a misrepresentative sense of scarcity of such items (Alsukaini, Sumra, Khan, & Awan, 2022). This in turn resulted in a real shortage as people start stocking items, leading to a major increase in demand and price of product (O'brien, Moore, & McNicholas, 2020).

The belief in false news and misinformation triggers distrust in the general population and raises the level of anxiety in healthy people as well as those with pre-existing mental wellbeing (Aslam, Awan, Khan, Aslam, & Mohmand, 2021; Awan & Aslam, 2020). Those rumors and misinformation were spread fast since the start of 2020 through digital and social media platforms. After the outbreak of Coronavirus, when misinformation and fake news start circulating on social media, WHO named it "Infodemic" (excess of information). The number of users in social media platforms has been growing rapidly in both the developed and developing countries. Millions of people record their symptoms online every day, using the words "fever", "cough" or "sore throat" and they frequently use the internet to search for health-

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related information. Approximately 80% of all internet users constantly search for their health information. However, information also carried some misinformation that leads towards negative outcomes (Qin et al., 2020; Sharif, Awan, & Paracha, 2021). In response to the outbreak of rumors WHO declared that it is necessary to minimize the people's exposure towards social media posts or any news which are not from any reliable source (Hua & Shaw, 2020). WHO noted this issue about how social media plays a significant role in spreading fear among general public, pointed out that it identifies some basic drivers that cause fear, anxiety and stigma (Aslam, Awan, et al., 2020) that triggers the spread of misinformation and rumor, especially through social media platforms (Liu et al., 2020). The fear of COVID-19 pandemic also caused mutual discrimination among societies to start an outbreak and the fear and concern was heightened through misperception in society; for example, a post office in a rural Canadian town evacuated staff following receipt of a parcel from Wuhan, China (Chen, Chen, Pakpour, Griffiths, & Lin, 2020; Lin, 2020).

There are evidences from history that television viewership usually increases during a drastic situation (Havas & Sulimma, 2020) similar as what happened during the pandemic. This is so because audiences not only wanted to get updates but they also view television to minimize their boredom (Khan et al., 2021; Scopelliti, Pacilli, & Aquino, 2021). During the pandemic media channels have recorded an increase of 20% in the use (Mongkhon et al., 2021; Schroyer, 2021). The Global Web Index survey reported that in 2020 roughly a quarter of U.S. and British citizens increased their use of Facebook and Twitter due to quarantine (Basch et al., 2020). A recent study shows 61% of increase in the use of social media during the lockdown times (Nabity-Grover, Cheung, & Thatcher, 2020). COVID-19 being the first pandemic of this digital age faced a serious challenge of the flow of information (Wong, Leo, & Tan, 2020). It was reported that in the US greater than 1700 adults share fake news or misinformation about COVID-19 being unable to think about logic, what to share, and is it accurate or not (Pennycook, McPhetres, Zhang, Lu, & Rand, 2020). Misinformation and rumors on social media also lead to fear and panic. The spread of information during pandemic times was the real challenge globally as stated by the World Health Organization (WHO) Director, "*We are just not only fighting with pandemic but we are fighting with infodemic as well*" (Zarocostas, 2020). COVID-19 has been repeatedly named the "*killer virus*" on the popular social networking application WeChat (Wiederhold, 2020). Social media is one of the major platforms through which people seek and get information. Globally, one in three people were engage in social media and two-thirds of those who are using the internet during the hard times of COVID-19 (Alsukaini et al., 2022). Previous research reported social media as a medium of spreading accurate and timely information but during COVID-19 the social media carried misinformation along with accurate information. Digital technologies played a much better role in controlling the spread of rumors e.g. the Singapore government used WhatsApp to provide accurate information to the general public (Ting, Carin, Dzau, & Wong, 2020). Considering the important aspect of misinformation during the pandemic times, this study was designed to conduct a systematic literature review (SLR) of the said issue.

2 Research Methodology

This study used systematic literature review (SLR) considering that traditional reviews lack identification of what is known and what is not known as compared to traditional reviews. The SLR differ from the traditional reviews by adopting a replicable scientific process and is meant to lesser chances of errors through exhaustive search of already published material (Tranfield, Denyer, & Smart, 2003). In the present study for select a sample, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were used which were proposed by Liberati et al. (2009) and updated by Page et al. (2021). The flow diagram for the current study using PRISMA is depicted in figure 1.

The search query used was "((“Coronavirus” OR “COVID-19” OR “Pandemic”) AND (“Misinformation” OR “Rumors” OR “Fake news” OR “Myths”) AND (“Social media” OR “Information” OR “Infodemic” OR “News” OR “Psychological wellbeing” OR “Mental health” OR “Misperception” OR “Panic” OR “Technology” OR “Psychological consequences” OR “Public health”))". This search resulted in a total of 144 articles and 20 were included in this study. The types of publications were quantitative (16), qualitative (1) and conceptual (3) which is depicted in figure 2.

The primary criterion for the selection of articles was language. All those publications other than English language were eradicated followed by a criterion that articles must be peer-reviewed and published in academic journals of repute. The list of journals included in the study are mentioned in Figure 3.

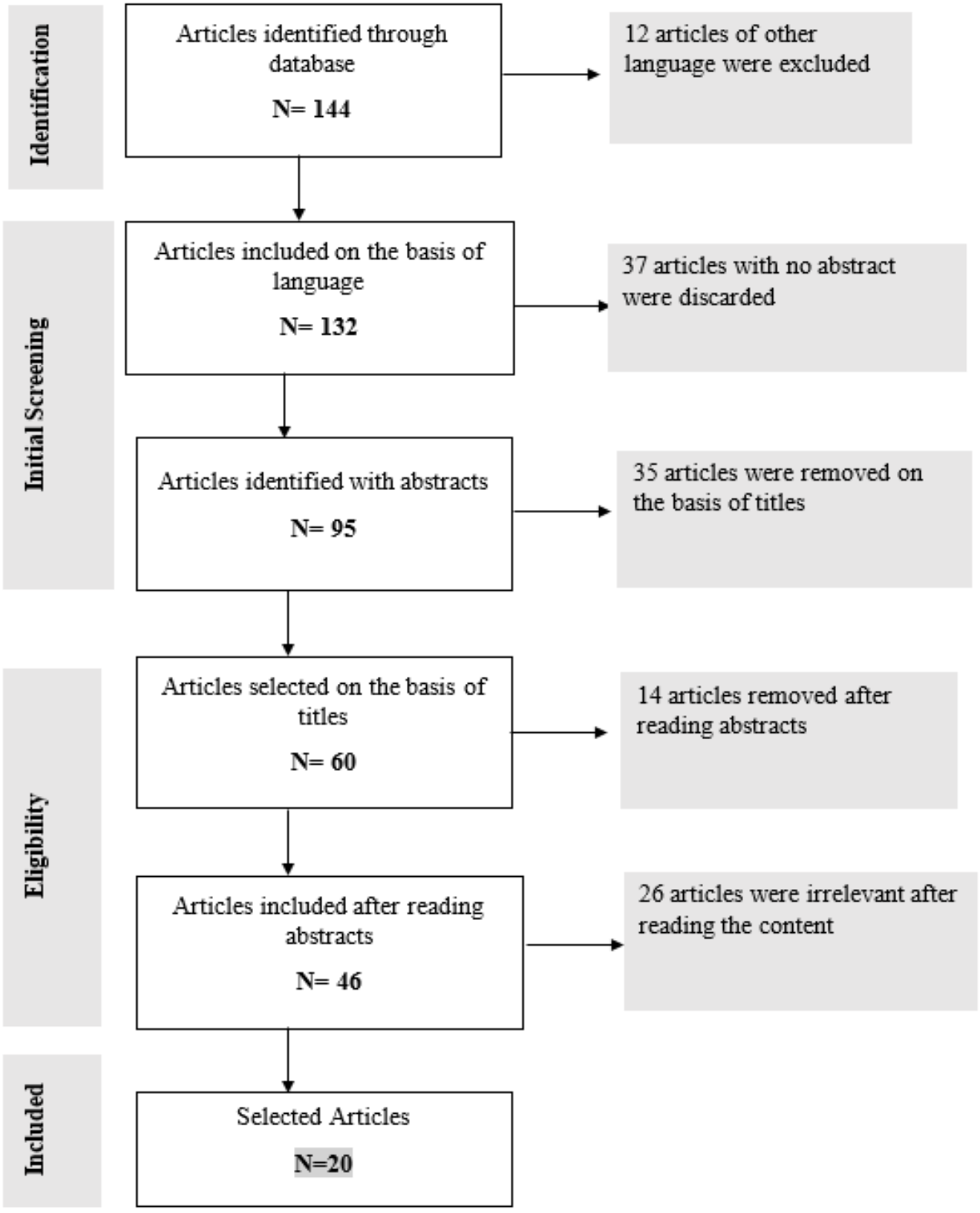

Figure 1: PRISMA 2020 Flow diagram for current study (Adapted from (Page et al., 2021).

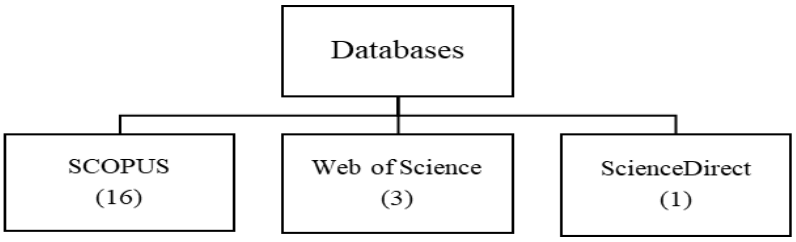

Figure 2: Databases and number of publications.

Telematics and Informatics	*Emerging Infectious Diseases*	*International Journal of Environmental Research and Public Health*
Online Social Networks and Media	*Journal of Content, Community And Communication*	*Cognitive Research: Principles and Implications*
Policy Sciences	*Plos ONE*	*Technological Forecasting and Social Change*
Psychological Science	*BMJ Global Health*	*Journal of Medical Internet Research*
Journal of Preventive Medicine and Public Health	*Health Policy and Technology*	*Media and Communication*
Online Information Review	*Journal Of Librarianship And Information Science*	*Health Education Research*

Figure 3: Names of Journals included in the study.

3 Results

Extensive research was noted during the pandemic times but most of them were clinical in nature considering the novelty of the virus. The current study incorporated those important publications focusing on the misinformation or fake news through social media. The summary of included articles is provided in table 1. Along with other important details of each publication a summary of findings of each paper is provided also.

After an extensive review of literature key themes were identified which emerged from the reviewed articles. These themes demonstrate the relationship between human mind, individual motivation, and cultural factors in sharing of fake content and how government and health officials play their role in controlling the infodemic. The review of articles is disseminated in four categories or themes. The first category is about what drives an individual to disseminate misinformation on social media platforms. The second category is about how human behavior in disseminating misinformation about COVID-19 is influenced by cognition. The third category is about how cultural factors prompt the behavior or action of spreading misinformation. The fourth category is about how government and health professionals can play a role in combating this infodemic. These key themes are tabulated in Table 2.

3.1 The motivation behind misinformation sharing

Sharing of fake news and misinformation regarding COVID-19 was at its peak in the early months of the outbreak. The motivation behind sharing rumors and misinformation regarding COVID-19 is an important factor that leads towards sharing fake content. According to the recent research conducted in Nigeria, altruism (sharing of false information

Table 1: Summary of the articles included.

S/N	Author (Year)	Database	Theme	Journal / Conference Name	Research Type	Country	Findings
1	(Roitero et al., 2020)	Scopus	Infodemic of COVID-19: can people judge misinformation in an objective way	International Conference on Information and Knowledge Management, Proceedings	Conceptual	United States	Findings of the study shows that employees use different information sources, and both assumptions and health-related sites are viewed. There are significant connections between the workers' justifications and the consistency of the judgment.
2	(Zhang, Chen, Jiang, & Zhao, 2020)	Scopus	Rumors regarding health mislead perception of public health: purchase craze in China during COVID-19	International Journal of Environmental Research and Public Health	Conceptual	China	Findings reveal that the general misconception of the distinctive psychology of confusion, sociocultural perception, and actions of acceptance jointly informs the expectations of people in misinformation and thus activates buying craze behavior.
3	(Tasnim, Hossain, & Mazumder, 2020)	Scopus	Social media and impact of misinformation about COVID-19	Journal of Preventive Medicine and Public Health	Conceptual	United States	Findings demonstrate that the mass media, healthcare agencies, community-based institutions, and some other critical stakeholders can develop strategic relationships and can launch common channels for spreading credible health messages. Also, modern technology like natural language processing or data mining techniques should be implemented in the identification and elimination of web content with no empirical basis from all social networking sites.
4	(Bastani & Bahrami, 2020)	Scopus	Social media and misinformation related to COVID-19: a qualitative study from Iran	Journal of medical Internet research	Qualitative	Iran	According to findings of the study cultural factors, demand pressures for details during the downturn, the effortlessness of information dissemination through social networks, marketing incentives, and the inadequate legal regulation of online contents are the major reasons for spreading of misinformation. Repercussions of misinformation transmission about coronavirus involve psychosocial; economic; state of health; healthcare system and moral ones.
5	(Su, 2021)	Scopus	Use of social media and discussion: beliefs and misinformation about COVID-19	Telematics and Informatics	Quantitative	India	Finding demonstrate that heuristic processing is significantly associated with the susceptibility of sharing fake news.

Continued **Table 1:** Summary of the articles included.

S/N	Author (Year)	Database	Theme	Journal / Conference Name	Research Type	Country	Findings
6	(Vraga & Bode, 2021)	Scopus	Response to address misinformation of COVID-19 on social media	Emerging Infectious Diseases	Quantitative	-	Findings of the study shows that social media (Facebook) exposure to a corrective graph decreased misunderstandings about the science COVID-19 preventive approach, however, fake news did not influence negative perceptions about COVID-19 protection.
7	(Marco-Franco, Pita-Barros, Vivas-Orts, González-de-Julián, & Vivas-Consuelo, 2021)	Scopus	COVID-19 and vaccination: spread of fake news	International Journal of Environmental Research and Public Health	Quantitative	Spain	Findings of the study exhibit that instead of compulsory COVID-19 vaccination, an approach based on educating the public regarding the advantages of vaccination is recommended. Disagreements between health practitioners are constructive but opting for good practice and the protocols of the code of ethics, should be resolved.
8	(Ceron, de-Lima-Santos, & Quiles, 2021)	Scopus	Fake News in the COVID-19 era: identifying trends by fact-checking	Online Social Networks and Media	Quantitative	Brazil	According to findings of the study there is a multifaceted linking between politics and health crisis during the pandemic. Conclude by presenting a generic model which is in our belief is most appropriate for topic modeling and an agenda for future research.
9	(Alvi & Saraswat, 2020)	Scopus	Processing information for sharing fake news regarding COVID-19 on social media	Journal of Content, Community and Communication	Quantitative	India	This study proposed a research model to study the effect on information processing of selected variables and the vulnerability to falling to misinformation.
10	(Greene & Murphy, 2020)	Scopus	Fake news of COVID-19 and individual differences	Cognitive Research: Principles and Implications	Quantitative	Ireland	Findings illustrate that reaction to fake news about COVID-19, false memories can emerge and the sensitivity to this misinformation is influenced by the awareness and engagement of the individual with COVID-19 information, and also their propensity to examine critically.
11	(Hartley & Vu, 2020)	Scopus	Combating with fake news in the era of COVID-19	Policy Sciences	Quantitative	-	According to findings of the study a formal mathematical model demonstrates that there are direct effort by social media platforms and governments, alongside pressure from social networks, that can decrease the possibility of users who come across fake news, embrace it and then further circulate it.

Continued **Table 1:** Summary of the articles included.

S/N	Author (Year)	Database	Theme	Journal / Conference Name	Research Type	Country	Findings
12	(Kebede et al., 2020)	Scopus	Myths, perception, and beliefs of individual regarding COVID-19: study in Ethiopia	PLoS ONE	Quantitative	Ethiopia	According to findings of the study risk communication and community engagement struggles should consider regional and township differences of myths and false assurances. Spread reliable information while filter out misconceptions and false facts, all types of content must be appropriately used and controlled.
13	(Islam, Laato, Talukder, & Sutinen, 2020)	Scopus	Sharing of misinformation and social media exhaustion during COVID-19	Technological Forecasting and Social Change	Quantitative		Findings demonstrate that too much use of social media have problematic implications, particularly the amplified spreading of misconceptions.
14	(Pennycook et al., 2020)	Scopus	Fighting with misinformation on social media	Psychological Science	Quantitative	-	Findings indicates that, encouraging people to care about accuracy is a convenient way to enhance decisions about what to post online.
15	(Li, Bailey, Huynh, & Chan, 2020)	Scopus	YouTube as a source of seeking information regarding COVID-19	BMJ Global Health	Quantitative	United States	Findings of the study demonstrate that about one-quarter of the most-watched YouTube videos on COVID-19 featured false information, reaching to millions of viewers globally. As the recent pandemic intensifies, public health authorities must better use YouTube to provide timely and reliable information and to reduce the dissemination of rumors.
16	(Obiała, Obiała, Mańczak, Owoc, & Olszewski, 2021)	Scopus	Accuracy of articles about COVID-19 prevention shared on social media	Health Policy and Technology	Quantitative	-	Findings illustrate that top 30 articles regarding covid-19 were shared through Facebook. Out of which 20% were inaccurate and were related to hand washing measures for COVID-19. The majority of the articles shared were related to the treatment of COVID-19 by washing hands frequently and wearing a mask.
17	(Apuke & Omar, 2020b)	Web of Science	The motivation behind social media users in spreading fake news and misinformation on COVID-19	Online Information Review	Quantitative	Nigeria	Findings illustrate that altruism, instantaneous news sharing, social interaction, and self-promotion triggers fake news sharing regarding the COVID-19 pandemic among users of social media in Nigeria. Primarily, altruism was the main contributor of false news sharing behavior linked to COVID-19, preceded by rapid sharing of news and social interaction.

Continued **Table 1:** Summary of the articles included.

S/N	Author (Year)	Database	Theme	Journal / Conference Name	Research Type	Country	Findings
18	(Montesi, 2021)	Web of Science	Understanding fake news in times of COVID-19 crisis	Journal of Librarianship and Information Science	Quantitative	Spain	According to findings of the study fake news does not harm or stance any threat to the health or safety of citizens – the damage it causes is most of the time intangible and spiritual. However, there is importance of a community of democratic values to fight false news.
19	(Apuke & Omar, 2020a)	Web of Science	Factors that affect the dissemination of rumors and misinformation about COVID-19	Health Education Research	Quantitative	Nigeria	Findings demonstrate that social support is the best indicator of sharing fake news linked to the COVID-19 pandemic. Perceived SNS dependence, information-seeking, and para-social interaction to be important predictors of fake news sharing. Fake news information significantly moderated the impact of fake news sharing linked to COVID-19.
20	(Apuke & Omar, 2021)	Science Direct	Fake news in COVID-19: predictors of sharing misinformation on social media	Telematics and Informatics	Quantitative	Nigeria	According to findings of the study altruism was the most important factor that contribute towards false news sharing of COVID-19. We also observed that people use social media for information exchange, socialization, information searching, and pass time predicted the sharing of false information about COVID-19.

Table 2: Key Identified Themes.

Key Themes	Source	No. of publications
The motivation behind misinformation sharing	(Apuke & Omar, 2020b; Islam et al., 2020; Pennycook et al., 2020)	3
Human minds and the spread of misinformation	(Apuke & Omar, 2020a, 2021; Greene & Murphy, 2020; Montesi, 2021; Roitero et al., 2020; Su, 2021)	6
Role of Cultural factors in spreading misinformation and rumors	(Alvi & Saraswat, 2020; Bastani & Bahrami, 2020; Li et al., 2020; Zhang et al., 2020)	4
Role of government and healthcare worker in controlling infodemic	(Ceron et al., 2021; Hartley & Vu, 2020; Kebede et al., 2020; Marco-Franco et al., 2021; Tasnim et al., 2020; Vraga & Bode, 2021)	7

without expecting any return), instant news sharing, self-promotion, and socialization are a predictors of fake news sharing. Altruism is one of the major factors that drive individuals to share content on social media without expecting any return (Apuke & Omar, 2020b). The motivations behind the spread of fake news are depicted in figure 5. It is further discussed in the literature that individuals who are dependent upon their intuitions could not distinguish between true and false information. They just believe and share what they perceive rather than searching for scientific knowledge (Pennycook et al., 2020). Similarly, according to Islam et al. (2020) individuals share fake content or misinformation regarding COVID-19 for entertainment and self-promotion purposes.

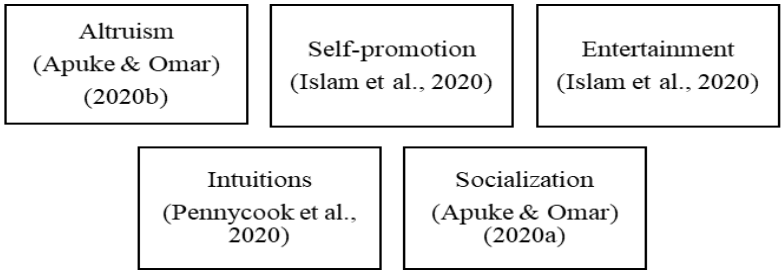

Figure 4: Motivations behind the spread of fake news.

3.2 Human minds and the spread of misinformation

During the recent pandemic sharing of misinformation became a trend. According to Su (2021) frequent use of social media leads individuals to believe in rumors and fake news. Individuals usually believe in those things which are consistent with an individual's preexisting beliefs and visions (Montesi, 2020). The human mind plays a critical role here, as demonstrated by Greene and Murphy (2020). The individuals who are lacking critical thinking believe and share fake information more than those who have strong critical thinking mindset. The role of critical thinking of individuals is very much important in controlling the flow of misinformation about COVID-19. Similarly, individuals who have lack of knowledge about COVID-19 do the same in sharing fake content on social media (Apuke & Omar, 2020a). Contrary to it Apuke and Omar (2020b) further explained that age and gender have no significant effect on sharing fake news while level of education and contextual factors play a significant role in it. According to Roitero et al. (2020) people get information from multiple sources. They check health-related websites to get accurate information. However, (Apuke & Omar, 2020b) demonstrated that social media users should explore the authenticity of information and share information only when they have a reliable and authentic source. Sharing fake news is a real challenge as people cannot distinguish between what is true and what is false which deviates them from searching information from relevant professionals i.e. health professionals in case of COVID-19 (Montesi, 2021).

3.3 Role of Cultural factors in spreading misinformation and rumors

In sharing of fake content and misinformation regarding COVID-19 on social media cultural factors also plays a significant role. In uncertain times individual cognition, social, and cultural factors usually drive an individual's belief in rumors (Zhang et al., 2020). Environment and surrounding situations of individuals strongly influence behavior (Alvi & Saraswat, 2020; Sipra, Aslam, Syed, & Awan, 2021). Cultural factors demand sharing of information during crisis. However, poor supervision of content that is shared on social media prompts the sharing of inaccurate information on social media platforms. Communities seeking treatment information, the vaccine and protection method also fuel the spread of misinformation about the pandemic (Bastani & Bahrami, 2020; Khan et al., 2021). It was also reported by Li et al. (2020) that videos on YouTube regarding COVID-19 have more misinformation than accurate information. Over one-quarter of the most-watched videos deliver misinformation about coronavirus. Similarly on Facebook majority of the articles leads towards misperception and most of the times those articles deliver precautionary measures of COVID-19. Consequences of dissemination of fake news also have significant effect on cultural factors such as economic, psychosocial, and health systems. However, the role of health professionals is very much important in controlling the spread of misinformation. While awareness and educating the general public by a health professional can also help in combating with astonishing consequences of fake content on media platforms (Bastani & Bahrami, 2020).

3.4 Role of government and healthcare workers in controlling Infodemic

Governments and health professionals can play a significant role in combating with such catastrophic events. Fake news exists and will exist in the future as well but we need to control the flow of misinformation and its negative consequences (Ceron et al., 2021). According to Vraga and Bode (2021) there is a need to address misinformation on social media platforms. To control the flow of misinformation, shared platforms can play a better role (Tasnim et al., 2020). Common platforms can help to provide accurate and precautionary information to end users on both online and offline platforms. Further use of advanced technologies such as the data mining approach can help to detect the accurateness of information on social media platform (Aslam, Awan, & Fatima, 2021). The study conducted by Marco-Franco et al. (2021) demonstrated that collaboration of health professionals would help in providing authentic information regarding safe vaccination to the citizens. However, the government can play a major role in minimizing the effect and share of rumors and misinformation but collaboration with social media platforms can be an effective approach. In crisis situations people try to seek up-to-date information from social media. Hence, social media can play a positive role as well in terms of providing accurate and timely information and it can help in combating with false news and rumors (Kebede et al., 2020). About the use of social media platforms for sharing and accurate content, Facebook is the most dominant platform for sharing news and content hence it can be used to share and aware the general public about accurate information. Buzzsumo (data manager application) can be used to investigate health-related information and research shared on social platforms (Obiała et al., 2021).

4 Conclusion

This study is the SLR on how social media plays a major role in disseminating misinformation and fake news during the uncertain times of COVID-19. A total of 20 articles were taken from three famous databases (Scopus, Web of Science and ScienceDirect). The inclusion and exclusion of articles was based on language, titles, abstract, and content. This pandemic emerged in the world when the human race is connected digitally. It was found that altruism, instant news sharing, self-promotion, and socialization are a predictor of fake news. Furthermore, the human mind plays a significant role in spreading misinformation. Hence the role of critical thinking of individuals is very much important in controlling the flow of misinformation. Also, cultural factors and government play an important role in spreading and controlling misinformation, respectively. Information and data related to pandemics and disasters spread quickly on social media platforms but with accurate information, there is also a lot of misinformation and fake news fake. The same happened during this uncertain time. People share misinformation and rumors based on what they hear and see on online platforms without investigating or exploring accurate information from an authentic source. While disseminating rumors and misinformation leads to severe stress and anxiety among people that affect an individual's well-being, it is necessary to have control over exposure towards rumors and misinformation. Awareness through social media is much important and has a positive impact as it is also used for the positive purposes by sharing picture and status of "staying at home". The experience of individuals who have recovered from Coronavirus can be shared so that the consequences of rumors and misperceptions can be minimized.

5 Limitations and Future Directions

Due to the theoretical nature of this study, further improvement and future research can be directed in the domain of fake news and similar catastrophic events. This is a literature review however, for better understanding and deep knowledge quantitative studies can be planned in future to get in-depth understanding about how rumors about the pandemic impact the life of an individual and how they believe on fake news and what were the consequences. The role of governments and medical workers in controlling the spread of rumors in the previous pandemic is less studied. Future studies can incorporate the role of governments and medical professionals in limiting the extent of misinformation. This review mainly highlights the issues regarding individual health about misinformation and rumors regarding it not only impact human health but also bring major consequences to other disciplines of life. Further research can be a focus on how rumors and misinformation on social media about pandemics affect other perspectives of life.

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