Review Article

new media & society
2022, Vol. 24(6) 1500–1522

DOI: 10.1177/1461444821038762
journals.sagepub.com/home/nms
SAGE

Health-related fake news on social media platforms: A systematic literature review

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Abstract
This review aims to (a) investigate the characteristics of both the research community and the published research on health-related fake news on social media platforms, and (b) identify the challenges and provide recommendations for future research on the subject. We reviewed 69 journal articles found in the main academic databases up to April 2021. The studies extracted data mainly from Twitter, YouTube, and Facebook. Most articles aimed to investigate the public's reaction to fake health information, concluding that health agencies and professionals should increase their online presence. The articles also suggest that future work should aim to improve the quality of health information on social media platforms, develop new tools and strategies to combat fake news sharing, and study the credibility of health information. Nonetheless, those in control of the platforms are the only ones which can take effective measures to ensure that their users receive reliable information.

Keywords
Disinformation, fake news, health, misinformation, social media, social media platforms, social networks

Introduction

The evolution of the Internet has offered new and more efficient channels of communication and collaboration between individuals, enabling them to share health information (Lopez et al., 2016). Social media platforms (SMPs) are the most common channels, and an ever-increasing number of individuals are using them to search for and share

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information related to health issues (Chen et al., 2018). With the rapid development of SMPs, users are increasingly sharing health information (Shi and Chen, 2014), making SMPs a popular means by which users access a great deal of information on the subject (Chen et al., 2018). Therefore, health services have transcended the individual and affect the health-related behavior of an entire group.

It is estimated that 80% of users of SMPs regularly search for medical information and 45% of these individuals would consider seeking a second medical opinion based on the information seen on SMPs (Basch et al., 2017). False information is augmented by the unregulated nature of the Internet, and thus it is challenging to help the public make qualified health decisions (Basch et al., 2017).

In fact, the quality of information is one of the main limitations of SMPs in the health field (Lopez et al., 2016), primarily because the quality of health knowledge shared online is quite varied (Haymes and Harries, 2016). Lopez et al. (2016) define quality of health information on SMPs in terms of four dimensions—credibility, completeness, relevance, and readability—while Weitzman et al. (2011) also consider accuracy and veracity. However, there are gaps that make it difficult to understand how widely accessed SMPs are used during periods of public health crises (Basch et al., 2015).

The lack of quality of information generates false stories containing partial truths or speculative stories that do not contain evidence (Lavorgna et al., 2018). These stories mimic news media content in form but not in organizational process or intent. False content may be classified as misinformation (false or misleading information) or disinformation (false information that is purposely spread to deceive people) (Lazer et al., 2018). Sometimes the term *fake news* is used as a political weapon (mainly after its diffusion in the 2016 United States presidential election), referring to different types of false content (Meel and Vishwakarma, 2020). We use this term because of its scientific value and because it draws attention to this important subject. Therefore, henceforth, we use the definition of fake news from Wardle (2017), as an umbrella term for the entire information ecosystem, including different types of misinformation ("the inadvertent sharing of false information") and disinformation ("the deliberate creation and sharing of information known to be false").

There are many studies aiming to develop methods to verify and detect fake news on SMPs. Hassan and Meziane (2019), de Souza et al. (2020), and Bondielli and Marcelloni (2019) review the techniques published in the literature for automatic fake news and rumor identification in online and socially produced data. Moreover, Au-Yong-Oliveira et al. (2019) carried out a systematic literature review (SLR) to understand how users interact with fake content on SMPs.

In the health area, Viviani and Pasi (2017) surveyed the literature about credibility assessment of online health information. Their results point out that the absence of predefined benchmarks and gold standard datasets, in addition to the difficulty of collecting and mining large amounts of data, has not yet received the attention it deserves. Wang et al. (2019) present an SLR about the nature and potential drivers of health-related fake news on SMPs. They also discuss the academic literature that revolves around vaccination and infectious diseases, drawing on various disciplines, frameworks, and empirical methods. Meel and Vishwakarma (2020) present a holistic view of how the information

is being weaponized to serve malicious motives and forcefully create biased user perceptions about a person, event, or firm.

The general environment of SMPs motivates people to share knowledge, but the shared information can be false, either intentionally with a predefined motive or unintentionally by mistake. Fake news is a real-time practical issue present in our lives every day due to sharing and/or consuming information on SMPs. Nonetheless, SMPs have also become an open stage for knowledge dissemination, discussion, sentiment sharing, and expressions of ideologies and/or emotions (Meel and Vishwakarma, 2020).

As a matter of fact, sharing information with others is motivated by the need to increase mutual understanding, strengthen relationships, and enhance bonds (Talwar et al., 2019). However, users looking to gain attention and popularity usually understate concerns about the truthfulness of the information. In the light of the motivations behind the sharing of fake news, we sought to investigate the relationship between knowledge management research, primarily knowledge sharing, and fighting health-related fake news on SMPs.

Therefore, the objective of this study is twofold: (a) to investigate the characteristics of both the research community and the published research on health-related fake news on SMPs, and (b) to identify the challenges and provide recommendations for future research on the subject.

To this end, an SLR was performed to answer the following research questions:

Research Question 1: What are the most commonly studied health issues and SMPs?

Research Question 2: What are the characteristics of both the research community and the published research on health-related fake news on SMPs?

Research Question 3: What are the stated objectives, conclusions, and future work proposed in the studies?

We then present a clear and updated overview of the subject of the studies and the main areas where further research is needed.

Methods

The SLR to assess the available literature on health-related fake news shared on SMPs began during the period of August to December 2019 and finished in April 2021. The search strategy was based on SLR protocols from Tranfield et al. (2003), Kitchenham (2007), and Biolchini et al. (2007). The steps were to (a) define the search string, (b) define the inclusion and exclusion criteria, (c) expand the scope of the search through snowballing the articles found, and (d) screen the articles found.

In the first step, we identified the important constructs in the literature for understanding the sharing of fake news on health-related information on SMPs. We then created a list with terms that were classified in four groups: knowledge management ("knowledge" coupled with "management," "sharing," "flow," "transfer," "donate," and "collect"), health-related information ("health") followed by SMPs ("social media" and

"social network"), and finally fake news ("fake news," "misinformation," and "disinformation"). Finally, the terms within the groups were combined using the keyword OR and the groups were combined using the keyword AND. Therefore, the following search string was applied to title, abstract, and keywords of the articles:

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TITLE-ABS-KEY (knowledge AND (management OR sharing OR flow OR transfer OR donate OR collect) AND health AND ("social media" OR "social network") AND ((fake AND news) OR misinformation OR disinformation))
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These terms were used to find and select the articles. However, the analysis was performed using the terms and content of the articles themselves. Thus, many terms that are not in the search string emerged in the analysis (e.g. technology, information quality).

The search for the articles was carried out in five databases: Scopus, Web of Science, Emerald, Wiley, and PubMed. Moreover, we also applied the search string in the Google Scholar search engine to ensure research published on the subject was fully contemplated. No time period was defined for the articles, which made it possible for all previously published studies with the investigated theme to have the same chance of being found (do Prado and de Campos, 2018). The search returned 37 results in the Scopus database, 29 in Web of Science, 2 in Wiley, 11 in PubMed, and no articles were found in the Emerald database.

The Google Scholar search engine does not allow for complex search strings of only the title, abstract, and keywords. It also does not automatically export search results (Fernández-Planells et al., 2021). Thus, the search carried out in Google Scholar applied the search string in the full text of the articles and returned approximately 17,700 results. Only the first 100 articles were considered due to the greater relevance of the topic and the number of citations. From the 100 papers found on Google Scholar, only 10 were not duplicated and were included in the review according to the eligibility criteria. Moreover, most of these 10 papers were found when performing the snowballing technique.

In the second step, we defined the following criteria to include and exclude articles: only full articles presenting original research (excluding review papers and editorials) written in English and published in journals with blind peer review, focused on analyzing health-related fake news (including misinformation and disinformation) shared on SMPs.

Subsequently, in the third step, we maximized the scope of the search by performing a single iteration of the snowballing technique (Wohlin, 2014) using the 179 articles found. This process yielded 46 new articles, totaling 225 articles. Finally, we removed 56 duplicate articles. Thus, this first step of identifying the studies resulted in 169 unique articles.

In the fourth and final step, we assessed the screening and eligibility by reading the full text of the 169 qualified articles found in the previous step. Then the decision was made whether to include the article based on the criteria defined in the second step. Here, 100 articles were excluded, resulting in 69 articles, which are listed in the Supplemental appendix. Our study analyzes these articles about health-related fake news shared on SMPs, published between 2010 and 2021 in highly influential journals.

The selected studies were then classified according to the year of publication, the period of data analyzed, method used, the period in which the research was published, the title of the work, the health issue, SMPs used in the dissemination of information, as well as the region and host country of the author's institutions.

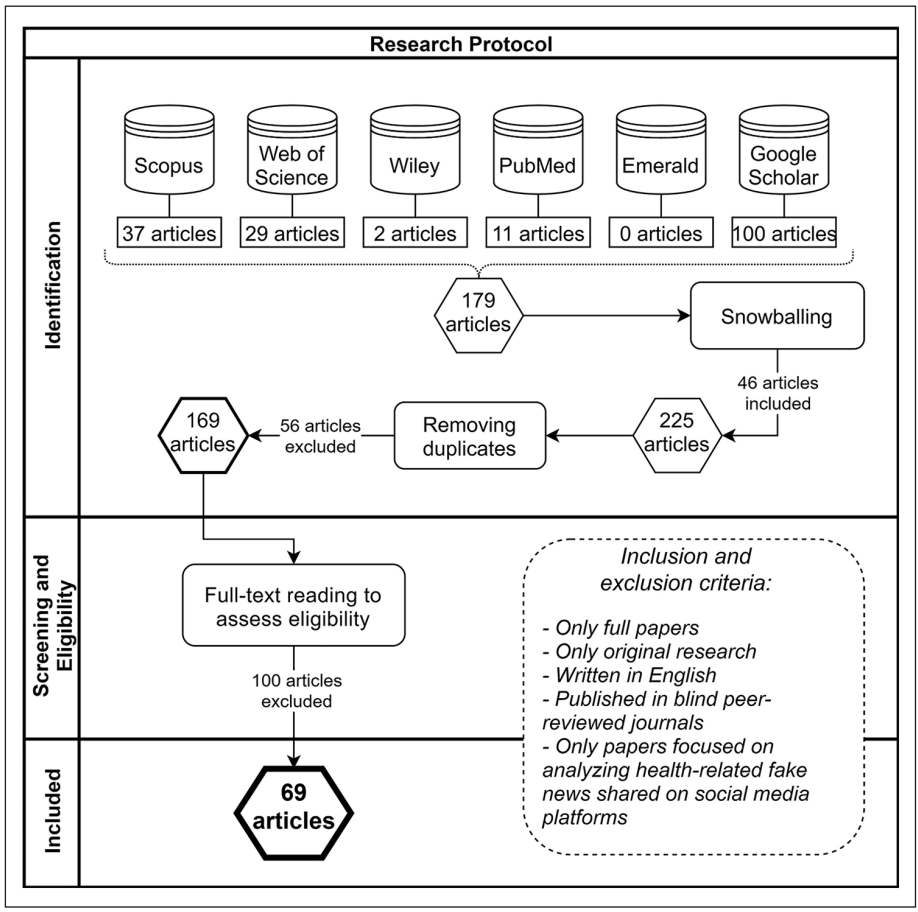

Figure 1. Research design adapted from PRISMA flow diagram.

Figure 1 illustrates the research design used in this SLR. We adapted the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram (Moher et al., 2009) according to our research protocol.

We used a digital spreadsheet in Google Sheets to organize the data collected during the process of reading the articles and extracting the information. The graphics were generated using Python v3.9.4 software with the matplotlib v3.4.1 library. Moreover, IRaMuTeQ 0.7 alpha 2 software was used for textual analysis, word stemming, and subsequent generation of the word cloud and similarity analysis (Camargo and Justo, 2013; Ratinaud, 2009). The reliability was defined by stability and replicability, according to Krippendorff (1980). The search on the databases and the coding of articles (see the codebook in the Supplemental material) was performed by the first author. The coding was performed twice by the author to achieve stability. Later, an external and independent reviewer also performed the coding of articles. The author and reviewer agreed on 90% of all coding, while the remaining 10% were discussed and subsequently agreed

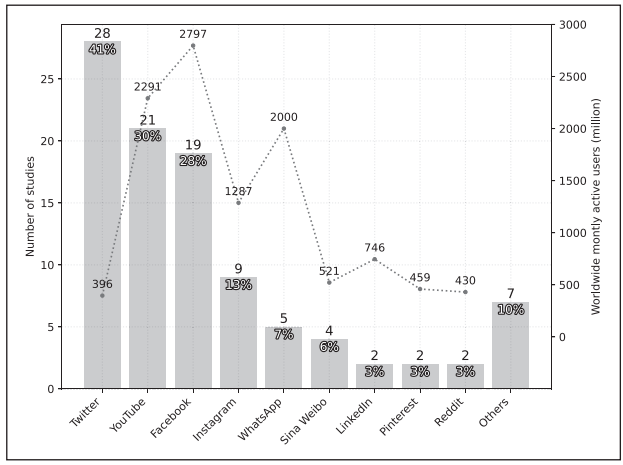

Figure 2. SMPs analyzed in the reviewed studies.

upon. This includes coding of the studies' health issue, SMPs, methods, as well as objectives, conclusions, and future work.

Results and discussion

This section presents the analysis of the 69 articles in the SLR. We present characteristics of both the research community and the published research on health-related fake news sharing on SMPs, as well as health issues, SMPs, objectives, conclusions, and future work of the studies.

SMPs

The most commonly studied SMP was Twitter, with 28 (41%) studies using this data source, as shown in Figure 2. Moreover, 21 (30%) studies analyzed YouTube data and 19 (28%) focused on Facebook. In addition, 9 (13%) studies analyzed Instagram, 5 (7%) applied the study in WhatsApp, 4 (6%) analyzed Sina Weibo, and 2 (3%) analyzed LinkedIn, Pinterest, and Reddit. Among the 7 (10%) remaining studies, there are 1 study that did not specify the SMP that was used and 6 studies that analyzed other platforms, such as SMSocialnetwork.com, Flickr, Dentaltown, and GooglePlus.

Twitter has 396 million active users (Kemp, 2020), which is far fewer users than other less studied platforms. Facebook has the biggest user base, with 2.79 billion monthly active users worldwide, followed by YouTube with 2.29 billion, and WhatsApp with 2 billion active users (Kemp, 2020). Facebook and YouTube are within the top three most studied platforms; however, WhatsApp is the focus of only five case studies (Al Khaja et al., 2018; Apuke and Omar, 2021; Chouhan et al., 2020; Liao et al., 2020; Osuagwu et al., 2021). WhatsApp is the most active messenger app in the world (Kemp, 2020), and it is the main channel for spreading false information in many parts of the world (Newman et al., 2020). However, very few studies have analyzed the fake news shared on this SMP.

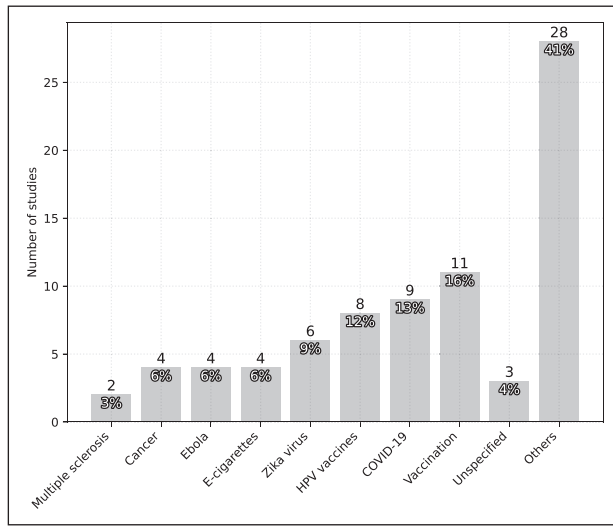

Figure 3. Specific health issues focused on in the studies from the SLR.

As Al Khaja et al. (2018) argue, data collection in messaging apps is naturally limited due to their private nature.

Figure 2 compares the number of studies analyzing each SMP with the number of monthly active users of the platform (Kemp, 2021). The sum of the percentages is greater than 100% because there are works that analyzed more than one SMP (Apuke and Omar, 2021; Chouhan et al., 2020; Stahl et al., 2016).

SMPs with the largest number of users are not necessarily the most studied in the academic literature. This is mostly explained by the availability of tools and data disclosure for analysis by SMPs themselves. More studies are done on SMPs that offer application programming interfaces (APIs) for automatically collecting users' data. WhatsApp was found to be one of the main sources of concern regarding false information sharing, but very few studies have analyzed this SMP due to its nature and lack of tools and data. An attempt to contain the dissemination of fake news in WhatsApp is represented by the *Agência Lupa* initiative, from the Brazilian newspaper *Folha de São Paulo*. They launched a robot in WhatsApp so that users can verify the legitimacy of information received by forwarding the message to the robot. The content goes through a verification step, which is handled by journalists if the robot is unable to automatically detect its truthfulness (Equipe TecMundo, 2020). However, the initiative to seek the truthfulness of the content before sharing must still come from the user.

Specific health issues

Figure 3 illustrates the health issue that is focused on in the studies. Vaccination (e.g. vaccine hesitancy and sentiment, pro- and anti-vaccination, vaccination in children) was addressed in 11 (16%) studies.

There is also a significant number, 9 (13%), of studies that focused on the coronavirus disease 2019 (COVID-19) pandemic, which represents a major challenge to global human well-being (Pennycook et al., 2020). In addition, 8 (12%) studies investigated specific cases of vaccination against human papillomavirus (HPV; Basch and MacLean, 2019; Massey et al., 2018). Furthermore, 6 (9%) studies analyzed cases of Zika virus; 4 (6%) articles focused on each Ebola, electronic cigarettes (e-cigarettes), and cancer (e.g. prostate, cervical, and gynecologic cancers; Chen et al., 2018; Picanço et al., 2018; Steinberg et al., 2010; Teoh et al., 2018); 3 (4%) studies did not address a specific disease; and 2 (3%) studies focused on multiple sclerosis (MS). Finally, 28 (41%) studies dealt with different health issues, such as human immunodeficiency virus (HIV), heart attack, hypertension, epilepsy, dentistry fissure sealants, measles, neoplasms, H1N1 or swine flu, diabetes, and rheumatoid arthritis.

Characteristics of the research community and the published research

The studies were published between 2010 and 2021 (Melchior and Zanini, 2019). Only 5 (7%) studies were published in 2021, which is expected because the search in the databases was carried out during this same year. The year with the highest number of published works on the subject was 2018 (18% or 26% of the studies), which indicates a growing body of knowledge on the subject. However, most studies (22% or 32% of the studies) analyzed data from the year 2015.

The 69 studies were published across 49 journals. The majority (40% or 82%) are from the medical field, while the remaining (9% or 18%) are multidisciplinary. The *Journal of Medical Internet Research* is highlighted with eight articles included in the analysis, followed by the journal *Vaccine* where five articles were published. Moreover, three articles were published in each of the journals *Human Vaccines* and *Immunotherapeutics, PLoS ONE*, and *International Journal of Environmental Research and Public Health*. In addition, two articles were published in each of the following journals: *Public Health, European Journal of Public Health*, and *Health Communication*.

The studies were written by more than 120 researchers from 40 countries: 38 (55%) studies were from the United States, 7 (10%) from each of Australia, China, and Italy, while Canada was home to 5 (7%). The other countries correspond to four or less studies each.

The method employed in each of the studies was classified as qualitative, quantitative, or both. Most studies (60% or 87%) used both quantitative and qualitative methods in a complementary way. Moreover, 5 (7%) of the studies identified only qualitative methods, and 4 (6%) used only quantitative methods.

We performed the analysis of terms in abstracts, keywords, and methods. The word clouds presented in Figure 4 analyze the frequency of terms used in the content of three specific sections of the 69 articles studied: the abstract, keywords, and methods. We ignored the most common words like “health,” “information,” “social,” and “media” because they would have dominated the visual representations.

The biggest words in the abstract word clouds presented in Figure 4 show the prevalence of studies analyzing fake news shared through videos. They also highlight the most

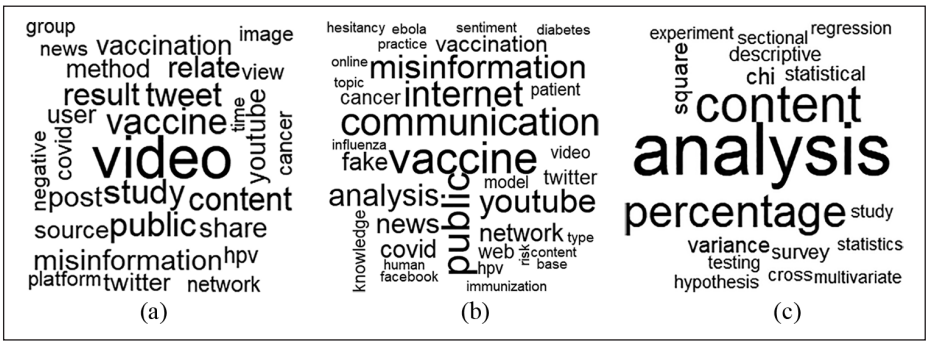

Figure 4. Distribution of terms based on the frequency of their use in the studies from the SLR: (a) Abstracts, (b) Keywords, (c) Methods.

frequent health issues (COVID-19, cancer, HPV), prevention (vaccine, vaccination), and SMPs (Twitter and YouTube). The biggest words in the methods cloud refer to content analysis and percentage, which many studies used together.

We also performed a similarity analysis, which is another form of textual analysis. This is a statistical approach used to present the relationship between the terms in the text. The relationship between the terms is based on the percentage of co-occurrence of these terms, where thicker lines indicate higher percentages and the larger the word, the more frequently it was used in the text. Figure 5 illustrates the terms used in the abstracts of the analyzed studies. The subject of this study is directly related to the strong connection between the terms "health," "information," "social," and "media." The analysis shows that one of the most discussed public strategies for containing outbreaks and diseases is vaccination, with anti- and pro-vaccination groups present. The studies on COVID-19 mostly discussed information about the disease. Videos shared on platforms like YouTube are also the target of many studies, and the terms "misleading" and "quality" are linked to this source of information.

Studies' objectives

The objectives of the 69 articles were analyzed and classified according to five categories, as shown in Figure 6: (a) analyze the public reaction, which includes studies that try to understand how the users perceive and react to fake news received in SMPs; (b) analyze the quality of information, which includes studies that aim to analyze the fake news itself and the strategies used to disseminate health-related fake news shared in SMPs; (c) study the impact of ideologies—here, most studies are focused on hesitancy to vaccinate and how users influence others to believe in fake news shared in SMPs; (d) analyze a disease outbreak—studies that try to understand details of a disease outbreak and its relationship with fake news; and (e) study information-related tools, which are mostly new tools for automatic detection or mitigation of fake news sharing in SMPs. It is worth mentioning that, in some cases, the same study was classified in more than one category, so the sum of the percentages is higher than 100%.

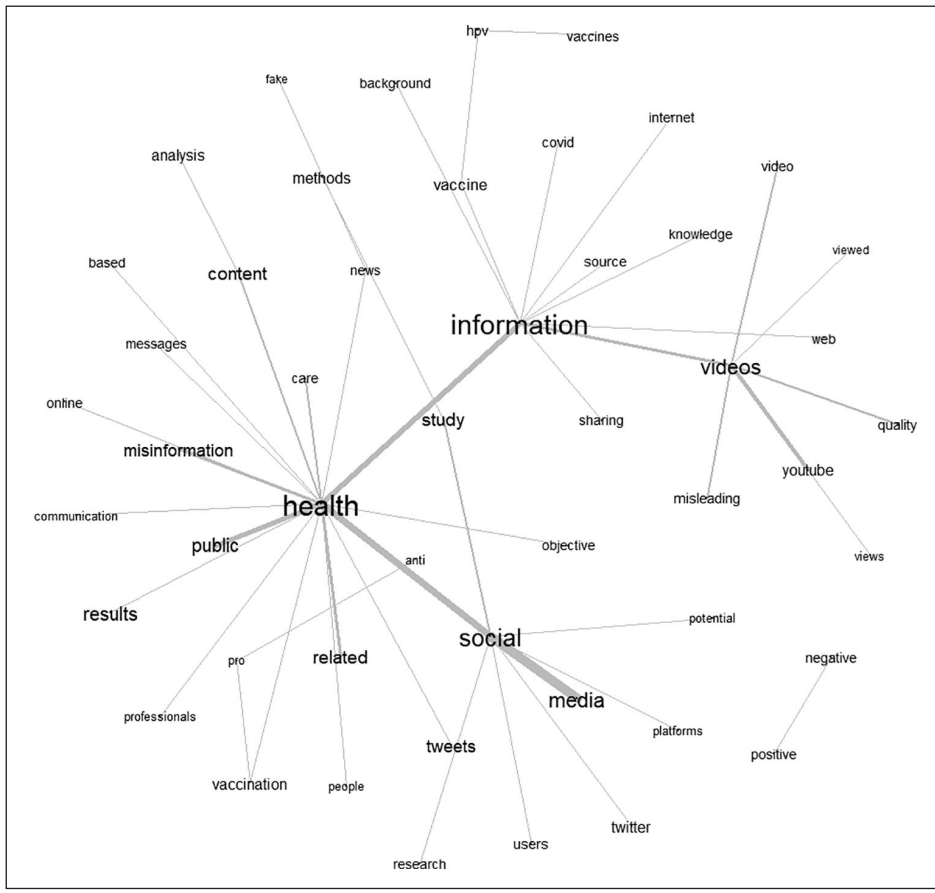

Figure 5. Similarity analysis of terms present in the abstract of the studies from the SLR.

Of the 69 articles analyzed, 44 (61%) aimed to analyze the public's reaction to fake health information. These studies sought to understand how and where users verified the health information they found on SMPs in greater depth (Pant et al., 2012; Pribadi et al., 2021; Tandoc et al., 2018). They mainly analyzed how the number of responses to messages of health affects the public's perception of the health issue, how the public feels about the information published (Kang et al., 2017), how the health issue is being perceived on SMPs (Lo et al., 2010), the effect of SMPs' posts (Merianos et al., 2016), how participation in communities or SMPs that specifically debate health issues affects the individuals' health (Seltzer et al., 2015; Seymour et al., 2015), which expressions are used, and what they mean for each health issue (Chu et al., 2017; Li et al., 2018).

More than half of the studies analyzed, 39 (54%), aimed to explore the quality of information available on SMPs. These studies explored the health-related content circulating on SMPs, analyzing the educational quality and popularity of the content available

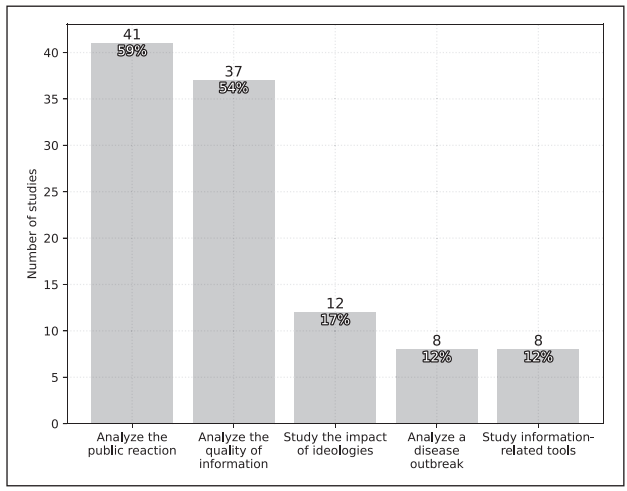

Figure 6. Objectives of the studies from the SLR.

online (Porat et al., 2019). Some intended to help public health agencies to develop efficient communication strategies on SMPs (Fung et al., 2016).

The impact of personal ideologies was studied in 13 (18%) of the articles. Personal experience and opinion were prevalent in discussions regarding vaccination. These articles focused on attitudes and behaviors of individuals who support vaccinations or are against them (Ekram et al., 2019; Gesser-Edelsburg et al., 2018; Lara-Navarra et al., 2020), the type of language used to convince and persuade users (Faasse et al., 2016), as well as the influence that vaccinated and unvaccinated parents have on their decision to vaccinate their children (Liao et al., 2020).

In addition, 8 (11%) studies aimed to analyze the outbreak of a disease, verifying where and how the debates about the disease took place and the main characteristics of these debates (Orr et al., 2016). Some of the studies explored if SMPs were used during this period to disseminate information (Seltzer et al., 2017) and which technologies and strategies can be implemented to prevent (Teoh et al., 2018) and control certain diseases. Finally, 8 (11%) studies explored tools related to health-related fake news, seeking to understand which resources are more efficient to contain the fake news on SMPs (Gesser-Edelsburg et al., 2018; Sui and Zhang, 2021; Vraga and Bode, 2018).

Studies' conclusions

The analysis of the conclusions of the 69 articles was carried out and classified according to six categories, as shown in Figure 7: (a) health agencies should increase their online presence—these studies advocated the importance of improving public health communication strategies and argued that health professionals should increase their presence on SMPs to combat fake news; (b) SMPs remedy fake news, which includes studies that advocate that SMPs can combat fake news, for example, by using new tools to detect

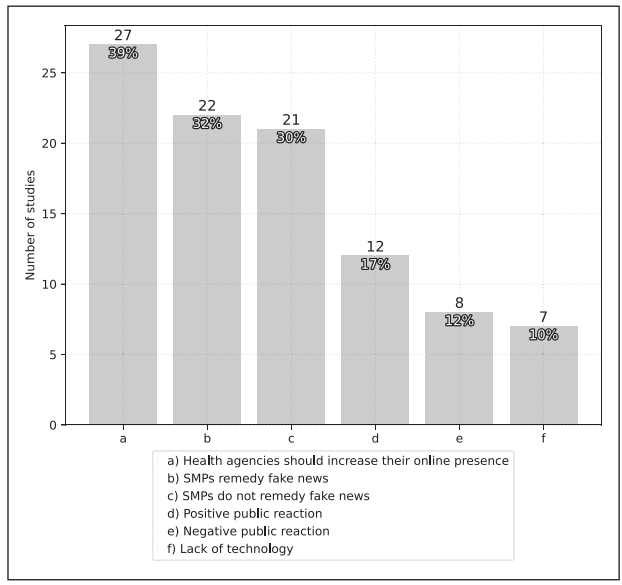

Figure 7. Conclusions of the studies from the SLR.

fake news or encouraging health professionals to correct information and help users; (c) SMPs do not remedy fake news, which includes studies that advocate that SMPs are inadequate sources of health information, and therefore should not be used by users for this end; (d) positive public reaction, which includes studies that describe SMPs being used to disseminate useful and correct information, highlight the advantages of efficient communication, and users sharing positive experiences with each other; (e) negative public reaction, which includes studies that describe the harm caused by spreading fake news, such as increasing vaccine hesitancy and ideologies based on fake news; and (f) lack of technology, which includes studies that advocate the need for new strategies and technologies to combat the sharing of fake news, mainly efficient tools for automatic fake news detection.

The conclusion of most studies (27% or 38%) makes it clear that there is a need for greater online presence by health agencies and professionals, mainly on SMPs. Greater integration between citizens and health professionals on SMPs is also necessary to improve public health communication strategies (Kang et al., 2017; Pulido et al., 2020), correct fake news, and help users to develop a critical view (Chen et al., 2018). Moreover, regulatory authorities should monitor health-related information released through SMPs (Al Khaja et al., 2018; Sui and Zhang, 2021). However, it is worth mentioning that promoting online education and awareness is also the role of researchers, not only health professionals (Chouhan et al., 2020; Seltzer et al., 2015).

The conclusion that was mentioned in 25 (35%) studies was that SMPs can prevent or remedy health-related fake news (Lo et al., 2010). In other words, SMPs can be used to analyze user-produced content in real time (Scanfeld et al., 2010); to extract highlighted

information, correct incorrect and incomplete health-related information, and then alert users of the risks associated with fake news (Merianos et al., 2016); and to understand users' feelings, and promote the dissemination of positive behavior and disseminate knowledge (Scanfeld et al., 2010; Singh et al., 2012). Therefore, it is up to the health authorities to employ social strategies to improve communication management, respond to public concerns, and translate academic knowledge to the society (Chew and Eysenbach, 2010; Pennycook and Rand, 2021).

According to the findings of 21 (29%) studies, SMPs do not have the power to remedy health-related fake news. These studies argue that they are inadequate sources of health information (Steinberg et al., 2010; Vos and Buckner, 2016). In fact, they found a lack of quality in health-related information available online (Ekram et al., 2019; Leong et al., 2018; Sui and Zhang, 2021). On the contrary, alternative and dangerous advice was offered (Haymes and Harries, 2016).

In terms of public reactions, 12 (17%) papers' conclusions pointed to a positive public reaction to health information available online (Keim-Malpass et al., 2017). Some users are aware of the content available and look for appropriate ways to authenticate the veracity of the information on SMPs (Tandoc et al., 2018).

On the contrary, 8 (11%) studies found a negative public reaction to the health information available online. It is essential to understand the motivators of certain attitudes and behaviors on SMPs (Kang et al., 2017; Massey et al., 2018) and which ideologies predominate to encourage health authorities (Guidry et al., 2020) to adopt effective communication strategies (Picanço et al., 2018; Sommariva et al., 2018). Finally, the need of technology to analyze information quality was mentioned in the conclusions of 7 (10%) of the studies (Bode and Vraga, 2018; Lara-Navarra et al., 2020).

Overall, it was possible to classify the studies' rating of the content of health information available on each SMP. There were 35 positive ratings and 67 negative ratings.

Of the 69 studies analyzed, 18 concluded that Twitter presents low-quality health information. The users who were more often exposed to negative opinions and fake news about HPV vaccines were more likely to subsequently replicate these negative opinions and fake news (Dunn et al., 2015), very few tweets contained information that would help individuals respond to a health crisis appropriately (Vos and Buckner, 2016), HPV vaccine coverage was lower in states where safety concerns, fake news, and conspiracies made up higher proportions of exposures, suggesting that negative representations of vaccines in the media may reflect or influence vaccine acceptance (Dunn et al., 2017; Lara-Navarra et al., 2020). The prevalence of negative vaccine sentiment was demonstrated through diverse messaging, framed around skepticism and distrust of government organizations that communicate scientific evidence supporting positive vaccine benefit (Kang et al., 2017).

Nevertheless, 12 papers considered Twitter to be a good platform to combat health-related fake news, with less propensity to disseminate misleading information. In fact, 51% of the Tweets represented a positive viewpoint (Keim-Malpass et al., 2017), fake news about Ebola was circulated at a very low level globally (Fung et al., 2016), and there is the potential of using Twitter to conduct "infodemiology" studies for public health (Chew and Eysenbach, 2010). Moreover, Twitter provides an opportunity to identify misuses or misunderstandings of antibiotics, to promote positive behavior change, and to disseminate valid information (Scanfeld et al., 2010).

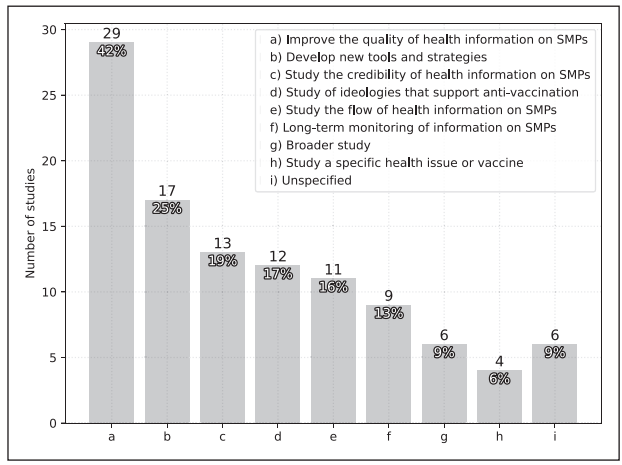

Figure 8. Recommendations for future work from the studies.

YouTube was determined to be an ineffective source of information in 14 cases. The videos shared in the platform contain erroneous and incomplete information (Ekram et al., 2019), and there are many videos with a negative tone especially toward vaccines (Donzelli et al., 2018). Moreover, videos from trustworthy sources like university and health organizations were scarce (Bora et al., 2018). On the contrary, six studies presented a positive perception of this SMP, where the majority of videos on e-cigarette health effects were educational/medical/news (Albarracin et al., 2018; Merianos et al., 2016).

Facebook was considered as a source of low-quality health information in 13 studies. This SMP needs the presence of health professionals to deconstruct the effect of negative comments that mention the suffering, pain, trouble, hard, and death of cancer patients (Picanço et al., 2018). On Facebook, users build a social relationship with known and unknown people, but develop a relationship of intimacy and trust which also motivates the sharing of fake news between the parties (Bode and Vraga, 2018). The fake news received about COVID-19 transmission when vaping, mainly during the outbreak, may further increase severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) transmission rates (Janmohamed et al., 2020). The other SMPs were evaluated by fewer studies, and for this reason, they will not be discussed in detail.

Studies' future work

Studies' future work were classified into the eight categories illustrated in Figure 8: (a) improve the overall quality of health information on SMPs, which includes studies that highlight the need for pursuing this broader goal in future work; (b) develop new tools and strategies to combat fake news sharing, mostly studies that mention not only the need for more efficient tools for detecting fake news in SMPs but also the need for strategies to minimize the negative impact of fake news sharing; (c) study the credibility of

health information on SMPs, which includes studies that recommend exploring the effect of various factors on the credibility of health information for users of SMPs; (d) study of ideologies that support anti-vaccination, to understand vaccine hesitancy; (e) study the flow (origin, dissemination, and reception) of health information on SMPs; (f) long-term monitoring of information shared on SMPs, which includes studies that highlight the importance of following the trends of sharing fake news on SMPs for a longer time period in order to enhance the understanding of the issue and make better predictions; (g) conduct a broader and more comprehensive study, looking to expand studies to other SMPs, health issues, or time periods; and (h) study a specific health issue or vaccine in order to obtain a better understanding. In addition, there were 6 (8%) studies that did not specify future work.

Most studies (29% or 40%) recommended future work to improve the quality of health information on SMPs. An initial step toward this goal is to develop public health communication strategies that range from increasing public health education (Vos and Buckner, 2016), greater participation of health professionals and academia in disseminating accurate information (Gonzalez-Estrada et al., 2015; Pulido et al., 2020), promoting positive changes in behavior (Scanfeld et al., 2010), to the analysis of the influence of visual effects (text and images) on the credibility of SMPs' users (Seltzer et al., 2015). Another alternative for increasing the quality of health information on SMPs is to carry out campaigns to correct global health fake news (Pulido et al., 2020), including encouraging and empowering users (Singh et al., 2012) to refute false or misleading information about health and the provision of appropriate sources to accompany their refutation (Bode and Vraga, 2018; Tangcharoensathien et al., 2020).

The lack of efficient tools and strategies to fight health-related fake news was highlighted by 19 (26%) studies. Developing new tools and strategies is imperative (Pulido et al., 2020) to allow the automatic identification of fake news before it is widely disseminated (Chew and Eysenbach, 2010; Lara-Navarra et al., 2020; Syed-Abdul et al., 2013), as well as developing strategies to minimize the negative impacts of specific diseases (Niknam et al., 2021) and that are able to identify how users could authenticate news available on SMPs (Tandoc et al., 2018). Fake news may create serious complications in the treatment of diseases and cause a reduction in immunization behaviors (Pulido et al., 2020), such as those happening in the COVID-19 case (Janmohamed et al., 2020).

The credibility of health-related information on SMPs can be enhanced by joint efforts with governments, platform managers, health professionals, and educators (Southwell et al., 2019; Sui and Zhang, 2021). In addition, preparing users of SMPs to encounter fake news might be as important or even more important than direct corrective responses to health-related fake news. Namely, interventions to increase media literacy enhance their ability to identify credible health information (Chouhan et al., 2020; Southwell et al., 2019).

In addition, studying the credibility of health information on SMPs was suggested in 15 (21%) studies (Pennycook et al., 2020). Furthermore, 12 (17%) studies recommended exploring ideologies and strategies that support anti-vaccination (Blankenship et al., 2018; Guidry et al., 2020; Liao et al., 2020). Studies of the origin, diffusion, and reception of information on SMPs were also proposed in 12 (17%) studies (Niknam et al., 2021; Surian et al., 2016). Monitoring SMPs in the long term was mentioned in 9 (12%)

works (Haymes and Harries, 2016; Li et al., 2018). The need for broader studies arose in the future work of 6 (8%) studies (Becker et al., 2016; Dunn et al., 2017; Huber et al., 2019), and 4 (6%) studies recommended studying a specific health issue or vaccination (Merianos et al., 2016). Finally, as previously discussed, 6 (8%) studies did not present suggestions for future work.

Conclusion

Among the 69 articles reviewed, which were published between 2010 and 2021, the data analyzed referred mainly to the year 2015, although the studies included in the SLR include data from 2005 to 2020. The content analysis of the abstracts, keywords, and methods highlighted that the most studies analyzed video sharing fake news. The most commonly analyzed diseases in the articles were COVID-19, HPV, Zika virus, Ebola, and cancer. However, the most prevalent health issue in this SLR was general vaccination (people for and against vaccination). The SMPs most frequently found in the studies are Twitter, YouTube, and Facebook. In addition, most articles used qualitative and quantitative methods together.

Although we used the terms knowledge management, sharing, flow, transfer, donate, and collect in the search string, they did not appear frequently in the analysis, which demonstrates the lack of articles from knowledge management research in the fight against health-related fake news. In the knowledge management field, the articles that we found are about motivation for sharing fake news (strategy and technology tools that explain this user's behavior). Therefore, this field of research may invest more effort to investigate how to fight health-related fake news on SMPs using the body of knowledge it contains, rather than why and how the knowledge flows, is shared, transferred, donated, and collected.

The category analysis highlighted that most studies aimed to investigate the public's reaction to fake health information, health agencies should increase their online presence, SMPs have the power to avoid health-related fake news, and future work should seek to improve the quality of health information on SMPs.

This research shows substantial global coverage in the health field, specifically investigating health-related fake news shared on SMPs, supported by a range of health issues analyzed in different countries and SMPs. However, it was highlighted that it is crucial for health professionals to pay extra attention to users exposed to fallacious, inefficient, and dangerous online information. To this end, it is important that health agencies and professionals improve the quality of online communication through design strategies (Vos and Buckner, 2016), or even more specifically through text, images (Seltzer et al., 2015, 2017), and/or with tools that automatically assess the credibility of online health information (Lara-Navarra et al., 2020; Viviani and Pasi, 2017).

SMPs have the power to avoid fake news, but this power is not always exercised. Users' quality of life is directly impacted by health-related fake news, and those in control of SMPs are the only ones with the power to take effective measures to ensure that their users receive reliable information. In the meantime, health agencies and professionals should increase their online presence to help fight public fake news.

This SLR highlights the need for future research on private messengers such as WhatsApp and some challenges that arise when studying these platforms. The categorization of the conclusions and future work listed in the studies highlights the need for (a) developing novel tools and strategies to study and combat health-related fake news, especially tools for fact-checking the content shared on SMPs and detect fake news; (b) further research in order to understand the role of health literacy in the origin, spread, and consumption of health information on SMPs, aiming to improve digital literacy of users of SMPs; (c) studies to improve the current understanding on anti-vaccination ideologies; and (d) additional research to understand the complexities in the intersection of scientific research, responsible journalism, and content creation by laypeople (Seymour et al., 2015).

Our research highlights that the accuracy and quality of the information are especially important in health information shared on SMPs. In addition, we showed that users of SMPs are most impacted by information shared in WhatsApp (messenger with the most users worldwide and scarcely explored by research) and Facebook (the most commonly used SMP in the world).

Yet another line of research highlighted in our results is the need for a more specific SLR on vaccination and COVID-19, which were the health issues discussed most. The results obtained also provide the basis for a deeper analysis of the relationship between specific health issues and the SMP on which the information is disseminated. For example, what characteristics of users of SMPs intensify the dissemination of misleading information? Future work may focus on investigating the citizen sentiments in countries where there have been more deaths due to the COVID-19 disease outbreak. For example, what measures were taken during the outbreak? What were the main publications on SMPs during the pandemic? How were new cases of the disease treated in the different countries where the disease arose? What have the consequences been in people's lives (what has changed) after the pandemic? And, finally, have they developed new hygiene and food habits due to their experience of the pandemic?

Given that this research focused exclusively on SMPs, future work may extend this investigation to health-related fake news sharing on other media outlets such as websites, blogs, and forums, as well as in the traditional media (TV, radio, and newspaper). This study is limited to papers using the terms included in the search string, which analyze health-related fake news shared on SMPs. Moreover, the coding of the articles was performed by only one coder with one external reviewer to check the classification.

Health agencies, professionals, and governmental health organizations can use the results of this research to implement preventive policies to minimize health-related fake news on SMPs, to better instruct users about critical digital literacy, and, more importantly, to make decisions on the key subjects and methods of fighting fake news to improve the users' quality of life.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was financed in part by the *Coordenação de Aperfeiçoamento*

de Pessoal de Nível Superior—Brasil (CAPES)—Finance Code 001. We also appreciate the support provided by the *Conselho Nacional de Desenvolvimento Científico e Tecnológico* (CNPQ) and FCT—*Fundação para a Ciência e Tecnologia* (Portugal), national funding through research grant UIDB/04521/2020.

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Supplemental material

Supplemental material for this article is available online.

References

Al Khaja KAJ, AlKhaja AK and Sequeira RP (2018) Drug information, misinformation, and disinformation on social media: a content analysis study. *Journal of Public Health Policy* 39(3): 343–357.

Albarracin D, Romer D, Jones C, et al. (2018) Misleading claims about tobacco products in YouTube videos: experimental effects of misinformation on unhealthy attitudes. *Journal of Medical Internet Research* 20(6): e229.

Apuke OD and Omar B (2021) Fake news and COVID-19: modelling the predictors of fake news sharing among social media users. *Telematics and Informatics* 56:101475.

Au-Yong-Oliveira M, Carlos CPA, Pintor H, et al. (2019) Fake news and social networks: how users interact with fake content. In: Rocha Á, Adeli H, Reis L, et al. (eds) *New Knowledge in Information Systems and Technologies. WorldCIST'19 2019. Advances in Intelligent Systems and Computing*. Cham: Springer, pp. 195–205.

Basch CH and MacLean SA (2019) A content analysis of HPV related posts on Instagram. *Human Vaccines and Immunotherapeutics* 15(7–8): 1476–1478.

Basch CH, Basch CE, Ruggles KV, et al. (2015) Coverage of the Ebola virus disease epidemic on YouTube. *Disaster Medicine and Public Health Preparedness* 9(5): 531–535.

Basch CH, Zybert P, Reeves R, et al. (2017) What do popular YouTube™ videos say about vaccines? *Child: Care, Health and Development* 43(4): 499–503.

Becker BFH, Larson HJ, Bonhoeffer J, et al. (2016) Evaluation of a multinational, multilingual vaccine debate on Twitter. *Vaccine* 34(50): 6166–6171.

Biolchini JC, de A, Mian PG, et al. (2007) Scientific research ontology to support systematic review in software engineering. *Advanced Engineering Informatics* 21(2): 133–151.

Blankenship EB, Goff ME, Yin J, et al. (2018) Sentiment, contents, and retweets: a study of two vaccine-related twitter datasets. *The Permanente Journal* 22: 1–7.

Bode L and Vraga EK (2018) See something, say something: correction of global health misinformation on social media. *Health Communication* 33(9): 1131–1140.

Bondielli A and Marcelloni F (2019) A survey on fake news and rumour detection techniques. *Information Sciences* 497: 38–55.

Bora K, Das D, Barman B, et al. (2018) Are internet videos useful sources of information during global public health emergencies ? A case study of YouTube videos during the 2015 – 16 Zika virus pandemic. *Pathogens and Global Health* 112(6): 320–328.

Camargo BV and Justo AM (2013) IRAMUTEQ: Um software gratuito para análise de dados textuais. *Temas Em Psicologia* 21(2): 513–518.

Chen L, Wang X and Peng TQ (2018) Nature and diffusion of gynecologic cancer-related misinformation on social media: analysis of tweets. *Journal of Medical Internet Research* 20(10): e11515.

Chew C and Eysenbach G (2010) Pandemics in the age of Twitter: content analysis of tweets during the 2009 H1N1 outbreak. *PLoS ONE* 5(11): e0014118.

Chouhan V, Vasita ML and Goswami S (2020) The impact and role of social media for consciousness of COVID-19 pandemic. *Journal of Content, Community and Communication* 12: 250–262.

Chu KH, Allem JP, Cruz TB, et al. (2017) Vaping on Instagram: cloud chasing, hand checks and product placement. *Tobacco Control* 26(5): 575–578.

de Souza JV, Gomes J, Souza Filho FM, et al. (2020) A systematic mapping on automatic classification of fake news in social media. *Social Network Analysis and Mining* 10(1). Available at: https://arxiv.org/pdf/2012.11004.pdf

do Prado AE and de Campos FC (2018) Analise bibliométrica 1990-2014: inteligência competitiva. *Perspectivas em Ciencia da Informacao* 23(1): 71–88.

Donzelli G, Palomba G, Federigi I, et al. (2018) Misinformation on vaccination: a quantitative analysis of YouTube videos. *Human Vaccines and Immunotherapeutics* 14(7): 1654–1659.

Dunn AG, Leask J, Zhou X, et al. (2015) Associations between exposure to and expression of negative opinions about human papillomavirus vaccines on social media: an observational study. *Journal of Medical Internet Research* 17(6): e144.

Dunn AG, Surian D, Leask J, et al. (2017) Mapping information exposure on social media to explain differences in HPV vaccine coverage in the United States. *Vaccine* 35(23): 3033–3040.

Ekram S, Debiec KE, Pumper MA, et al. (2019) Content and commentary: HPV vaccine and YouTube. *Journal of Pediatric and Adolescent Gynecology* 32(2): 153–157.

Equipe TecMundo (2020) Agora você pode "desmascarar" uma fake news direto no WhatsApp. Available at: https://www.tecmundo.com.br/seguranca/205679-voce-desmascarar-fake-news-direto-whatsapp.htm?f (accessed 23 November 2020).

Faasse K, Chatman CJ and Martin LR (2016) A comparison of language use in pro- and anti-vaccination comments in response to a high profile Facebook post. *Vaccine* 34(47): 5808–5814.

Fernández-Planells A, Orduña-Malea E and Feixa Pàmpols C (2021) Gangs and social media: a systematic literature review and an identification of future challenges, risks and recommendations. *New Media & Society* 23: 2099–2124.

Fung ICH, Fu KW, Chan CH, et al. (2016) Social media's initial reaction to information and misinformation on Ebola, August 2014: facts and rumors. *Public Health Reports* 131(3): 461–473.

Gesser-Edelsburg A, Diamant A, Hijazi R, et al. (2018) Correcting misinformation by health organizations during measles outbreaks: a controlled experiment. *PLoS ONE* 13(12): e0209505.

Gonzalez-Estrada A, Cuervo-Pardo L, Ghosh B, et al. (2015) Popular on YouTube: a critical appraisal of the educational quality of information regarding asthma. *Allergy and Asthma Proceedings* 36(6): e121–e126.

Guidry JPD, Austin LL, O'Donnell NH, et al. (2020) Tweeting the #flushot: beliefs, barriers, and threats during different periods of the 2018 to 2019 flu season. *Journal of Primary Care & Community Health* 11: 215013272093272.

Hassan EA and Meziane F (2019) A survey on automatic fake news identification techniques for online and socially produced data. In: *Proceedings of the international conference on computer, control, electrical, and electronics engineering (ICCCEEE)*, Khartoum, Sudan, 21–23 September.

Haymes AT and Harries V (2016) 'How to stop a nosebleed': an assessment of the quality of epistaxis treatment advice on YouTube. *Journal of Laryngology and Otology* 130(8): 749–754.

Huber J, Woods T, Fushi A, et al. (2019) Social media research strategy to understand clinician and public perception of health care messages. *JDR Clinical and Translational Research* XX(X): 1–11.

Janmohamed K, Soale AN, Forastiere L, et al. (2020) Intersection of the web-based vaping narrative with COVID-19: topic modeling study. *Journal of Medical Internet Research* 22(10): e21743.

Kang GJ, Ewing-Nelson SR, Mackey L, et al. (2017) Semantic network analysis of vaccine sentiment in online social media. *Vaccine* 35(29): 3621–3638.

Keim-Malpass J, Mitchell EM, Sun E, et al. (2017) Using Twitter to understand public perceptions regarding the #HPV vaccine: opportunities for public health nurses to engage in social marketing. *Public Health Nursing* 34(4): 316–323.

Kemp S (2020) *Digital 2020: October Global Statshot*. Available at: https://datareportal.com/reports/digital-2020-october-global-statshot (accessed 6 November 2020).

Kemp S (2021) Digital 2021. *Global Digital Insights*: 103. Available at: https://datareportal.com/reports/digital-2021-global-overview-report

Kitchenham B (2007) *Guidelines for Performing Systematic Literature Reviews in Software Engineering*. Available at: https://www.elsevier.com/__data/promis_misc/525444systematicreviewsguide.pdf

Krippendorff K (1980) *Content Analysis: An Introduction to Its Methodology*. Thousand Oaks, CA: SAGE.

Lara-Navarra P, Falciani H, Sánchez-Pérez EA, et al. (2020) Information management in healthcare and environment: towards an automatic system for fake news detection. *International Journal of Environmental Research and Public Health* 17(3): 1066.

Lavorgna L, De Stefano M, Sparaco M, et al. (2018) Fake news, influencers and health-related professional participation on the web: a pilot study on a social-network of people with multiple sclerosis. *Multiple Sclerosis and Related Disorders* 25: 175–178.

Lazer DMJ, Baum MA, Benkler Y, et al. (2018) The science of fake news. *Science* 359(6380): 1094–1096.

Leong AY, Sanghera R, Jhajj J, et al. (2018) Is YouTube useful as a source of health information for adults with type 2 diabetes? A South Asian perspective. *Canadian Journal of Diabetes* 42(4): 395.e4–403.e4.

Li A, Huang X, Jiao D, et al. (2018) An analysis of stigma and suicide literacy in responses to suicides broadcast on social media. *Asia-Pacific Psychiatry* 10(1): e12314.

Liao Q, Fielding R, Cheung YTD, et al. (2020) Effectiveness and parental acceptability of social networking interventions for promoting seasonal influenza vaccination among young children: randomized controlled trial. *Journal of Medical Internet Research* 22(2): e16427.

Lo AS, Esser MJ and Gordon KE (2010) YouTube: a gauge of public perception and awareness surrounding epilepsy. *Epilepsy and Behavior* 17(4): 541–545.

Lopez DM, Blobel B and Gonzalez C (2016) Information quality in healthcare social media—an architectural approach. *Health and Technology* 6(1): 17–25.

Massey PM, Budenz A, Leader A, et al. (2018) What drives health professionals to tweet about #HPVvaccine? Identifying strategies for effective communication. *Preventing Chronic Disease* 15(2): 1–10.

Meel P and Vishwakarma DK (2020) Fake news, rumor, information pollution in social media and web: a contemporary survey of state-of-the-arts, challenges and opportunities. *Expert Systems with Applications* 153: 112986.

Melchior C and Zanini RR (2019) Mortality per work accident: a literature mapping. *Safety Science* 114: 72–78.

Merianos AL, Gittens OE and Mahabee-Gittens EM (2016) Depiction of health effects of electronic cigarettes on YouTube. *Journal of Substance Use* 21(6): 614–619.

Moher D, Liberati A, Tetzlaff J, et al. (2009) Preferred Reporting Items for Systematic Reviews and Meta-Analyses: the PRISMA statement. *PLoS Medicine* 6(7): e1000097.

Newman N, Richard Fletcher W, Schulz A, et al. (2020) *Reuters Institute Digital News Report 2020*. Available at: https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2020-06/DNR_2020_FINAL.pdf

Niknam F, Samadbeik M, Fatehi F, et al. (2021) COVID-19 on Instagram: a content analysis of selected accounts. *Health Policy and Technology* 10(1): 165–173.

Orr D, Baram-Tsabari A and Landsman K (2016) Social media as a platform for health-related public debates and discussions: the Polio vaccine on Facebook. *Israel Journal of Health Policy Research* 5(1): 1–11.

Osuagwu UL, Miner CA, Bhattarai D, et al. (2021) Misinformation about COVID-19 in Sub-Saharan Africa: evidence from a cross-sectional survey. *Health Security* 19(1): 44–56.

Pant S, Deshmukh A, Murugiah K, et al. (2012) Assessing the credibility of the "youTube Approach" to health information on acute myocardial infarction. *Clinical Cardiology* 35(5): 281–285.

Pennycook G and Rand DG (2021) The psychology of fake news. *Trends in Cognitive Sciences* 25(5): 388–402.

Pennycook G, McPhetres J, Zhang Y, et al. (2020) Fighting COVID-19 misinformation on social media: experimental evidence for a scalable accuracy-nudge intervention. *Psychological Science* 31(7): 770–780.

Picanço L, Biancovilli P and Jurberg C (2018) Beyond the drama: the beautiful life in news feeds on cancer. *Journal of Cancer Education* 33(2): 424–428.

Porat T, Garaizar P, Ferrero M, et al. (2019) Content and source analysis of popular tweets following a recent case of diphtheria in Spain. *European Journal of Public Health* 29(1): 117–122.

Pribadi P, Lolita L, Pangestuti RCA, et al. (2021) Knowledge and quality of life among Indonesian students during the COVID-19 pandemic. *International Journal of Public Health Science* 10(2): 451–458.

Pulido CM, Ruiz-Eugenio L, Redondo-Sama G, et al. (2020) A new application of social impact in social media for overcoming fake news in health. *International Journal of Environmental Research and Public Health* 17(7): 2430.

Ratinaud P (2009) *IRAMUTEQ : Interface de R pour les Analyses Multidimensionnelles de TExtes et de Questionnaires*. Available at: http://www.iramuteq.org

Scanfeld D, Scanfeld V and Larson EL (2010) Dissemination of health information through social networks: Twitter and antibiotics. *American Journal of Infection Control* 38(3): 182–188.

Seltzer EK, Horst-Martz E, Lu M, et al. (2017) Public sentiment and discourse about Zika virus on Instagram. *Public Health* 150(215): 170–175.

Seltzer EK, Jean NS, Kramer-Golinkoff E, et al. (2015) The content of social media's shared images about Ebola: a retrospective study. *Public Health* 129(9): 1273–1277.

Seymour B, Getman R, Saraf A, et al. (2015) When advocacy obscures accuracy online: digital pandemics of public health misinformation through an antifluoride case study. *American Journal of Public Health* 105(3): 517–523.

Shi J and Chen L (2014) Social support on Weibo for people living with HIV/AIDS in China: a quantitative content analysis. *Chinese Journal of Communication* 7(3): 285–298.

Singh AG, Singh S and Singh PP (2012) YouTube for information on rheumatoid arthritis—A wakeup call? *Journal of Rheumatology* 39(5): 899–903.

Sommariva S, Vamos C, Mantzarlis A, et al. (2018) Spreading the (fake) news: exploring health messages on social media and the implications for health professionals using a case study. *American Journal of Health Education* 49(4): 246–255.

Southwell BG, Niederdeppe J, Cappella JN, et al. (2019) Misinformation as a misunderstood challenge to public health. *American Journal of Preventive Medicine* 57(2): 282–285.

Stahl JP, Cohen R, Denis F, et al. (2016) The impact of the web and social networks on vaccination. New challenges and opportunities offered to fight against vaccine hesitancy. *Medecine et Maladies Infectieuses* 46(3): 117–122.

Steinberg PL, Wason S, Stern JM, et al. (2010) YouTube as source of prostate cancer information. *Urology* 75(3): 619–622.

Sui Y and Zhang B (2021) Determinants of the perceived credibility of rebuttals concerning health misinformation. *International Journal of Environmental Research and Public Health* 18(3): 1345.

Surian D, Nguyen DQ, Kennedy G, et al. (2016) Characterizing twitter discussions about HPV vaccines using topic modeling and community detection. *Journal of Medical Internet Research* 18(8): e232.

Syed-Abdul S, Fernandez-Luque L, Jian WS, et al. (2013) Misleading health-related information promoted through video-based social media: Anorexia on YouTube. *Journal of Medical Internet Research* 15(2): e30.

Talwar S, Dhir A, Kaur P, et al. (2019) Why do people share fake news? Associations between the dark side of social media use and fake news sharing behavior. *Journal of Retailing and Consumer Services* 51: 72–82.

Tandoc EC, Ling R, Westlund O, et al. (2018) Audiences' acts of authentication in the age of fake news: a conceptual framework. *New Media & Society* 20(8): 2745–2763.

Tangcharoensathien V, Calleja N, Nguyen T, et al. (2020) Framework for managing the COVID-19 infodemic: methods and results of an online, crowdsourced who technical consultation. *Journal of Medical Internet Research* 22(6): 1–8.

Teoh D, Shaikh R, Vogel RI, et al. (2018) A cross-sectional review of cervical cancer messages on Twitter during cervical cancer awareness month. *Journal of Lower Genital Tract Disease* 22(1): 8–12.

Tranfield D, Denyer D and Smart P (2003) Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management* 14(3): 207–222.

Viviani M and Pasi G (2017) Credibility in social media: opinions, news, and health information—a survey. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery* 7(5): e1209.

Vos SC and Buckner MM (2016) Social media messages in an emerging health crisis: tweeting bird flu. *Journal of Health Communication* 21(3): 301–308.

Vraga EK and Bode L (2018) I do not believe you: how providing a source corrects health misperceptions across social media platforms. *Information Communication and Society* 21(10): 1337–1353.

Wang Y, McKee M, Torbica A, et al. (2019) Systematic literature review on the spread of health-related misinformation on social media. *Social Science and Medicine* 240: 112552.

Wardle C (2017) Fake news. It's complicated. Available at: https://firstdraftnews.org/latest/fake-news-complicated/ (accessed 25 July 2020).

Weitzman ER, Cole E, Kaci L, et al. (2011) Social but safe? Quality and safety of diabetes-related online social networks. *Journal of the American Medical Informatics Association* 18(3): 292–297.

Wohlin C (2014) Guidelines for snowballing in systematic literature studies and a replication in software engineering. In: *ACM international conference proceeding series*, London, 13–14 May.

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