INPLASY

Dynamics of health information sharing on social media

INPLASY202360045
doi: 10.37766/inplasy2023.6.0045
Received: 15 June 2023
Published: 15 June 2023

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ADMINISTRATIVE INFORMATION

Support - No financial support was granted to do this research work.

Review Stage at time of this submission - Formal screening of search results.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202360045

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 15 June 2023 and was last updated on 15 June 2023.

INTRODUCTION

Review question / Objective Research Question - Since the focus of this review is a non-clinical question, the PICO framework will not be used. Given the qualitative nature of the research question in this review, a modified framework will be used; CEO (Context, Exposure and Outcome).
Context: Social media, Health and Covid-19
Exposure: Health content, health misinformation, health disinformation
Outcome: Sharing behaviour
RQ: Within the context of Covid-19, what are the reported dynamics of health information sharing on social media platforms?
Objectives
This review has the objective of systematically reviewing the available literature of evidence to achieve the following objectives:
1. To identify factors that influence sharing of health information on social media with a focus on Covid-19.
2. To explore the research frameworks (underlying theories) used to study social media health information sharing behaviour.
3. To categorise the health misinformation topics shared on social media in the included articles.
4. To identify the most studied social media platforms within the context of health information sharing among the included articles.
The review aims to collate studies in this domain, i.e., state of knowledge, and integrate the findings of those studies to answer the above research question.

Rationale Infodemiology is the science of distribution and determinants of information in an electronic medium, specifically the Internet, or in a population, with the ultimate aim to inform public health and public policy (Eysenbach, 2009) . An infodemic is defined as an overflow of information of varying quality which spreads across digital and physical environments during public health emergencies. It leads to a loss of trust in health authorities, confusion, risk-taking, and behaviours that can harm health (Calleja et al., 2021) . Opinion polarization, echo chamber effects, misallocation

of healthcare resources and increased vaccine hesitancy are some other examples of the negative repercussions of infodemics (Borges do Nascimento et al., 2022) . Infodemics are not a new phenomenon as human history has endured infodemics of various degrees during periods of public health distress (Eysenbach, 2020) For example, misinformation caused violence and targeted attacks on healthcare providers during the 2019 Ebola outbreak in the Democratic Republic of Congo (Tentolouris et al., 2021).

COVID-19 is the first global pandemic in the digital era of widespread mobile-device-supported social media, Big Data and AI (Gaffield, 2020) . It is believed that the combination of this digitised world and the global and acute nature of the crisis formed a fertile environment for infodemic spread. Health authorities' inability to disseminate timely and reliable health information because of inadequate evidence resulted in information voids. This contributed to escalating anxiety and confusion among the public (Calleja et al., 2021) . In an attempt to fill this information void, misinformation -information that is false but not intended to cause harm-, disinformation -false information that is deliberately created or disseminated with the express purpose of causing harm- and rumours - unverified information that can either be true or false- spread on social media (Ishizumi, Yau, 2023) .

To manage and flatten infodemic curves, research is warranted to guide and provide evidence-based recommendations to the involved stakeholders; governments, healthcare systems, research institutes, media and society at large. In a systematic review of reviews published in the Bulletin of the World Health Organization in 2022, it was mentioned that "Focus should be given to how users evaluate the validity and accuracy of such information [health information] and how they decide whether they will share the information with their social media contacts" (Borges do Nascimento et al., 2022) .

There is a need to understand how different forces and factors, i.e., dynamics impact the sharing behaviours and intentions of social media users, which in turn impacts how people evaluate and validate health content on social media platforms. Not only does understanding the behavioural dynamics of health information sharing on social media have the promising potential to untangle the nexus of misinformation sharing, but also informs creators of health information content on how to deliver evidence-based health information in a way that resonates with the targeted social media users and entices them to share it among their networks.

Condition being studied Covid-19, Infodemiology, health information, health communications and social media will form the domain of this search.

METHODS

Search strategy ("coronavirus"[MeSH Terms] OR "coronavirus"[Text Word] OR "sars cov 2"[All Fields] OR "sars cov 2"[MeSH Terms] OR "COVID-19"[All Fields] OR "COVID-19"[MeSH Terms] OR ("pandemic s"[All Fields] OR "pandemically"[All Fields] OR "pandemicity"[All Fields] OR "pandemics"[MeSH Terms] OR "pandemics"[All Fields] OR "pandemic"[All Fields])) AND ("social media"[MeSH Terms] OR "social media"[Title/Abstract] OR "online"[Title/Abstract] OR "online social networking"[MeSH Terms] OR "twitter"[Title/Abstract] OR "facebook"[Title/Abstract] OR "instagram"[Title/Abstract] OR "Tiktok"[Title/Abstract] OR "whatsapp"[Title/Abstract] OR "reddit"[Title/Abstract] OR "youtube"[Title/Abstract] OR "online setting"[Title/Abstract]) AND ("disinformation"[MeSH Terms] OR "consumer health information"[MeSH Terms] OR "propaganda"[MeSH Terms] OR "health communication"[MeSH Terms] OR "health promotion"[MeSH Terms] OR "information dissemination"[MeSH Terms] OR "health literacy"[MeSH Terms] OR ("fake news"[Title/Abstract] OR "health information"[Title/Abstract] OR "false information"[Title/Abstract] OR "health articles"[Title/Abstract] OR "rumor*"[Title/Abstract] OR "misinformation"[Title/Abstract] OR "health promotion"[Title/Abstract] OR "health communication"[Title/Abstract] OR "health literacy"[Title/Abstract] OR "conspiracy theor*"[Title/Abstract] OR "scientific misinformation"[Title/Abstract] OR "unreliable content"[Title/Abstract])) AND ("dissemination behavior"[Title/Abstract] OR "dissemination behaviour"[Title/Abstract] OR "intention to share"[Title/Abstract] OR ("willingness to share"[Title/Abstract] OR "citizen engagement"[Title/Abstract]) OR ("sharing behavior"[Title/Abstract:~4] OR "sharing behaviour"[Title/Abstract:~4] OR "sharing intention"[Title/Abstract:~4] OR "sharing beliefs"[Title/Abstract:~4] OR "sharing emotions"[Title/Abstract:~4] OR "sharing incentives"[Title/Abstract:~4] OR "sharing motives"[Title/Abstract:~4] OR "sharing drivers"[Title/Abstract:~4] OR "sharing factors"[Title/Abstract:~4] OR "sharing antecedents"[Title/Abstract:~4] OR "sharing predictors"[Title/Abstract:~4] OR "sharing practices"[Title/Abstract:~4]) OR ("sharing behavior*"[Title/Abstract] OR "sharing behaviour*"[Title/Abstract] OR "sharing

intention*"[Title/Abstract] OR "sharing beliefs*"[Title/Abstract] OR "sharing emotion*"[Title/Abstract] OR "sharing incentive*"[Title/Abstract] OR "sharing motiv*"[Title/Abstract] OR "sharing factor*"[Title/Abstract] OR "sharing practice*"[Title/Abstract])).

Participant or population Since the focus of this review is a non-clinical question, the PICO framework will not be used. Given the qualitative nature of the research question in this review, a modified framework will be used; CEO (Context, Exposure and Outcome). Context: Social media, Health and Covid-19 Exposure: Health content, health misinformation, health disinformation. Outcome: Sharing behaviour.

Intervention N/A.

Comparator N/A.

Study designs to be included There will be no limitation on the articles to be included by study design nor by type of publication. Both observational and interventional studies on social media users anywhere in the world will be included in the review.

Eligibility criteria Inclusion Criteria Our search will be restricted to: (1)Publication status: Because of the novelty and recency of the domain of infodemiology, both published and unpublished articles will be included in the review. This will ensure the relevance and validity of the evidence synthesised in this review. (2) Publication type: Full articles, conference proceedings, and abstracts, reprints, reports, commentaries, editorials, reviews, trial registrations, abstracts, book chapters, and posters. (3) Time limit: The search will start from 2019 to date of search as this is when COVID-19 hit the world. (4) Language: Given the skill set of the research team, only articles published in English will be included. (5) Geographic location: there will be no restriction on the geographic location because of the nature of social media. Social media users on different platforms can be from various parts of the world and misinformation generated in the US can find its way to the Middle East instantly. (6) Domain: Articles where the scope is on infodemiology and health information sharing on social media platforms during COVID-19. Exclusion criteria: As this is a new and diverse domain, the research team decided not to restrict the search to make sure all relevant articles are captured.

Information sources Databases to be searched:
1. PubMed
2. Scopus
3. Web of Science
4. CINAHL
5. EMBASE
6. PsycINFO
7. Google Scholar
8. Sociological Abstracts
9. Epistemonikos.

Grey literature search:
Based on published systematic reviews in the same discipline, the below grey literature sources were used:
- https://ethos.bl.uk/Home.do
- https://www.base-search.net/
- https://www.proquest.com/ via Primo
- https://www.worldcat.org/
- https://www.dart-europe.org/
- Targeted websites: WHO.org
- Consultation with contact experts (WHO experts, disinformation experts and domain-content owners).

Main outcome(s) Primary outcomes: Factors contributing to health information sharing on social media.

Additional outcome(s) Secondary Outcomes: The underlying theory for the sharing behaviour.

Data management
To ensure reproducibility and minimise error, all steps will be documented.
In Excel, all search details will be documented. There will be a tab for each database showing:
- Date of the first search
- Date of any subsequent searches
- Controlled vocabulary
- Keywords
- Number of results
- Additional tabs will be added for non-database sources, expert contacts and snow bowling efforts like citation tracking.

PRISMA flow diagram will be exported from Covidence to show the flow of articles from all sources.
Software
Covidence will be used for the following steps in the review: (Covidence is a web-based collaboration software platform that streamlines the production of systematic and other literature reviews)
- Import
- Deduplication
- Title and abstract screening
- Full-text screening
- Data extraction
- Quality assessment
- PRISMA flow chart

(NE) will set up the review on Covidence and will create the preliminary data extraction form. After piloting, (NE) will update the forms accordingly. (NE) will add (KK) and (HM) as reviewers.
Inclusion and exclusion criteria will also be added to the review settings and a list of reasons for exclusion will be populated.

Quality assessment / Risk of bias analysis Assessment for risk of bias in the individual studies will be done for each citation just after finishing its data extraction. The data synthesis and analysis will be stratified considering the individual study's quality. Reviewers are encouraged to add notes under each citation in Covidence to comment on its quality assessment. JBI Critical appraisal tools will be used to assess the quality of all included studies. The relevant checklist will be used for each study type.
Meta-bias(es)
To minimise information bias, duplicate extraction will be done on a sample of 10 articles; 5 will be double extracted by (NE) and (KK) and 5 will be double extracted by (NE) and (HM).
To minimise selection bias: duplicate screening for title and abstract as well as for full text will be done on a sample of 10 articles; 5 will be double-screened by (NE) and (KK) and 5 will be double-screened by (NE) and (HM).

Strategy of data synthesis Given the emerging nature of this domain and therefore the foggy view of the type and nature of the search results, the type of data synthesis will be decided after the search is run. If the included articles turn out to be heterogenous, meta-analysis will not be performed. If the included articles are qualitative in nature, a meta-synthesis will be performed. A narrative synthesis will be performed by organizing the description of the studies into logical categories; analyzing the findings within each of the categories; and synthesizing the findings across all included studies (Petticrew, 2003).

Subgroup analysis Based on the outcomes and contexts of the different articles included in the review, we might be able to do our subgroup analysis by social media platform and/or by population demographics.

Sensitivity analysis: 1. Google scholar was used to retrieve a sample of qualifying articles. The search query was: “Factors for sharing health information on social media during covid19”.
2. The list of preliminary qualifying articles was compiled by (NE) and a list of common keywords was created. This list formed the base for the keyword and MeSH terms’ search on Pubmed.
3. PubMed will be searched and not Medline to ensure capturing book chapters, in-process and ahead-of-print articles that might not be available on Medline.
4. In PubMed, there are no MeSH terms to capture the outcome concept (sharing behavior). Proximity search for Text words for sharing behaviour and sharing intention will be used.
5. The preliminary search on Pubmed (25), Scopus (42) and Web of Science (21) resulted in a narrow list of articles (88). Duplicate records were 30 (Covidence) leaving 58 articles to be screened.
6. To broaden the search results, (NE) tracked the preliminary eligible articles from WoS and sorted them according to the highest number of citations.
7. A list of recurrent keywords from those articles was compiled. The new keywords were added to the search strategy.
8. Sensitivity testing was done on Pubmed to make sure the preliminary qualifying articles (from Google Scholar) are showing the PubMed search results.

Language restriction English.

Country(ies) involved Given the nature of social media, there is geographic limitation on the research. The three authors are affiliated with the University of Aberdeen.

Other relevant information One author (NE) will run the search on the databases, export the articles and import the articles into Covidence. Covidence will deduplicate entries.
Abstract and title screening:
1. (NE) will screen all articles and add a decision of Yes/No/Maybe for each citation. The reason for exclusion will be chosen from the list of exclusion reasons pre-fed into Covidence.
2. (KK and HM) will independently screen 5 articles Each will add a decision of Yes/No/Maybe for each citation. The reason for exclusion will be chosen from the list of exclusion reasons pre-fed into Covidence.
3. Conflicts will be discussed and resolved collectively (KK, HM, and NE).
Full-text screening
1. (NE) will screen all articles and add a decision of Yes/No for each citation. The reason for exclusion will be chosen from the list of exclusion reasons pre-fed into Covidence.
2.(KK and HM) will independently screen 5 articles. Each reviewer will add a decision of Yes/No for each citation. The reason for exclusion will be chosen from the list of exclusion reasons pre-fed into Covidence.
3. Conflicts will be discussed and resolved collectively (KK, HM, and NE).

DE on Covidence 2.0
1. A Data Extraction Form (V1.0) will be developed by one author (NE) on Covidence.
2. A sample of 5 articles will be extracted by the three team members (NE), (KK) and (HM).
3. A discussion will take place to review how the three members extracted the data, and the Data Extraction Guide will be refined accordingly.
4. The updated Data Extraction Form (V2.0) will be used by three team members (NE), (KK) and (HM) to abstract data from 3 eligible articles.
5. A discussion will take place to review how the three members extracted the data, and the Data Extraction Guide will be refined accordingly.
6. The updated Data.

Keywords infodemiology, infodemics, social media, sharing behaviour.

Dissemination plans The review will be submitted for publication and the abstract will be submitted for presentation at relevant conferences.

Contributions of each author

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