Lessons Learnt from Risk Communication Strategies Implemented During COVID-19 Pandemic: A Scoping Review and SWOT Analysis*

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Abstract

Exploring efforts for communicating risk specifically tailored to COVID-19 global epidemic could facilitate the identification of program priorities and key implementation constructs most likely associated with positive outcomes. We aimed to identify key considerations and lessons learnt from communicating risk during COVID-19 pandemic through a systematic scoping review. All peer-reviewed publications, in English, indexed in PubMed, EBSCO, Web of Science, Wiley Online and Google Scholar databases from January 2019 to 22 December 2020 were reviewed. Studies were included if they described characteristics of risk communication strategies implemented during COVID-19 outbreak. Content analysis and a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis were performed. Eighteen studies met the inclusion criteria. Publications varied in terms of settings; however, the majority were descriptive studies. A range of key constructs relating to the implementation of risk communication during COVID-19 pandemic were identified: risk communication frameworks and evaluation models, message content characteristics, mis-information spread, cultural, political, and economic aspects. A list of suggestions based on research findings was further collated. Additionally, our SWOT analysis reflected multiple lessons learnt from in-practice communication of risk. This study contributes to the knowledge basis on risk communication during pandemics and provides some practical insights into key considerations and recommendations when implementing strategies for communicating risk. Findings can inform planning of ongoing research that more systematically designs, implements, and evaluates risk communication during COVID-19 pandemic.

Keywords: Risk Communication; Implementation; COIVD-19; Pandemic

Introduction

COVID-19 pandemic has imposed an overwhelming number of barriers to our everyday lives, organizations, healthcare systems, and governing authorities at large. Consequently, the implementation of effective risk communication strategies has never been more challenging.

Risk communication was defined by the World Health Organization (2017) as a prompt exchange of information, opinions, and advice between experts, officials, and members of the public who are exposed to a particular health-risk in an attempt to mitigate harmful effects. The aim of communicating risk during epidemics is not only to inform stakeholders of their potential risk, but also to promote awareness and adoption of protective behaviours for limiting the spread of infectious

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diseases. Strategies for communicating risk comprise internal and external communications. Whilst internal communication refers to the exchange of information between officials and internal stakeholders for developing common grounds for their responsibilities, external communication usually occurs between partners from various sectors, private and media entities, as well as the general public.

Communicating risk has been acknowledged by Harris (2018) as one of the vital, but challenging aspects of emergency interventions. In recent years, evidence-based guidelines for communicating risk practices have been published (Reynolds & Seeger 2005; World Health Organization 2017). On the other hand, governments across the world experienced a number of difficulties in communicating risk during COVID-19 pandemic (Tola 2020; Paulik, Keenan & Durda 2020). Research findings from previous outbreaks provide insights into risk communication strategies (Frost et al. 2019; Toppenberg-Pejcic et al. 2019); however, significant differences were evident during COVID-19 pandemic:

- health information seeking behaviours have shifted, with the Internet becoming one of the most important information sources nowadays (Radu et al. 2019);
- the magnitude of SARS-CoV-2 transmission is unprecedented;
- face-to-face interactions were limited and this created a greater reliance on online communication platforms, including social media.

The overarching aim of this scoping review is to explore within the existing body of evidence the essential constructs of risk communication strategies which have been implemented in the global context during COVID-19 outbreak. More specifically, the research question is: What are the key considerations of implementing risk communication strategies during COVID-19 pandemic? Findings from this scoping review could inform future efforts in communicating COVID-19 risk, aiding in planning and preparation, as well as potentially improving the way messages are developed and disseminated to the public.

Additionally, we propose a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis of these strategies, aiming to synthetize lessons learnt from their implementation. This type of analysis enables the evaluation of available resources in the context of external realities so that it could facilitate evidence-based decision making. SWOT analysis has been used in previous research investigating other healthcare related domains (Wang & Wang 2020). Despite being a subjective tool, it can nonetheless provide an overview of the efficiency of external health communication campaigns (Bobocea et al. 2016).

Research evidence on this topic is of a rather complex and heterogeneous nature. Therefore, a scoping review methodology was chosen as it is the most appropriate method for analysing evidence that has not been comprehensively reviewed thus far (Peters et al. 2015). Scoping reviews have been reported as a particularly useful tool for identifying key characteristics related to various concepts, such as risk communication strategies in the present study, in addition to being an appropriate method for investigating how research is conducted in certain fields (Munn et al. 2018).

Methods

The methodology protocol was conducted in accordance with the Joanna Briggs Institute (JBI) methodology for scoping reviews (Joanna Briggs Institute 2020), as well as the PRISMA Extension for Scoping Reviews developed by Tricco et al. (2018).

Eligibility Criteria

The concepts of interest were the key characteristics of risk communication strategies implemented during COVID-19 outbreak (such as implementation aspects, strengths, weaknesses, opportunities, threats). The context was not limited to a particular country and, therefore, studies implemented in the global setting were considered. All study designs were considered, except for opinion papers, commentaries or other such text papers which were excluded. This is due to the fact that the present review seeks to examine lessons learnt from the actual implementation of any risk communication strategy. Studies reporting on risk communication strategies not utilized during COVID-19 pandemic, non-English publications, without full-text versions available or those that were not peer-reviewed were also excluded.

Search Strategy

In accordance with JBI recommendations, a three-step search strategy was utilized. First, a preliminary search of PubMed and Google Scholar was undertaken to identify publications on this topic. An analysis of the text words contained in the titles and abstracts of retrieved articles was performed and identified keywords were used to develop a full search strategy. Secondly, a systematic literature search was conducted among five international electronic databases (PubMed, EBSCO, Web of Science, Wiley Online and Google Scholar). A similar search strategy was employed across all sources, using the following keywords: "risk communication", "pandemic", "COVID-19", "SARS-CoV-2", "coronavirus", "epidemic" and

"outbreak". Thirdly, the reference lists of articles included after full-text reading were searched for additional sources. The following limits were applied: publication years 2019-2020 and English language.
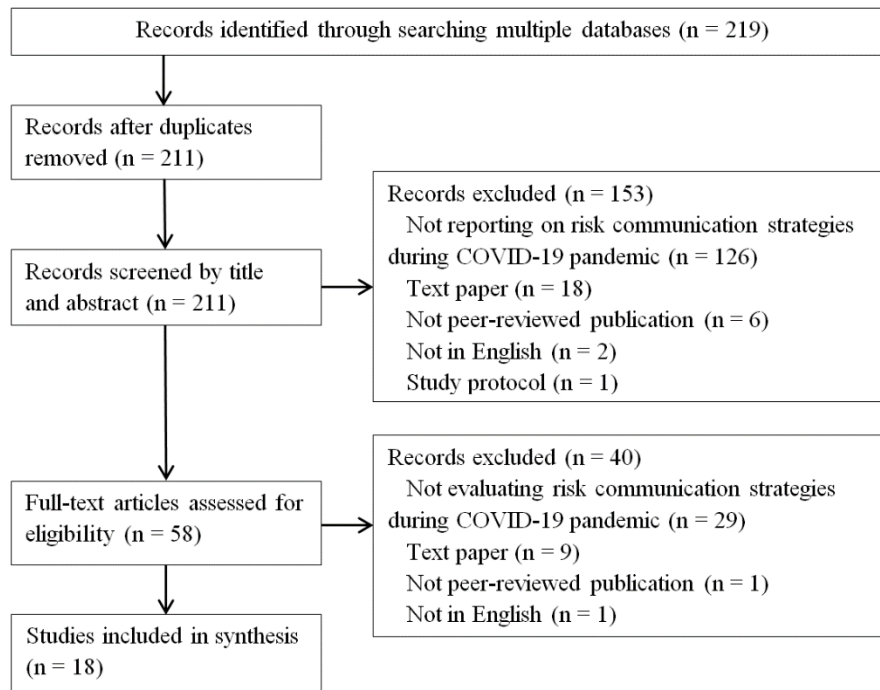
Study Selection

All retrieved papers were imported into a digital reference manager and duplicates were removed. Their titles and abstracts were firstly screened for relevance and afterwards eligible publications were thoroughly examined in full-text format against our eligibility criteria. A record was kept detailing the reasons for exclusion at full text screening. One author reviewed all studies and their progress was checked by the other reviewer, with any potential disagreement being discussed and resolved.

Data Extraction and Analysis

A pre-designed data extraction chart was used for extracting relevant information from all eligible studies, detailing publication identification features, methodology, description and key components of risk communication strategies, as well as other pre-planned data simplifications. One reviewer extracted the data, whilst the other verified this process. Where disagreements were identified, these were resolved through discussion between the two reviewers. A content analysis was performed, based on which a qualitative synthesis in the form of a coherent narrative was elaborated. Tabular and diagrammatic formats were further developed for synthetizing findings.

Results

The search strategy retrieved a total of 219 publications (*Figure 1*), from which 8 duplicates were removed, leaving 211 articles for initial screening of titles and abstracts against inclusion criteria. From this we identified 58 studies as potentially eligible and proceeded to their full text review, which retrieved 18 articles that met our inclusion criteria and were included in this synthesis. No further eligible publications were identified as a result of screening the reference lists of the 18 studies included in this review.

Figure 1: Flow diagram of study selection for scoping review process

Characteristics of Eligible Studies

Included studies differed considerably in terms of their settings. Most of the studies were conducted in Asian countries, more specifically three in China (Hu & Qiu 2020; Liao et al. 2020; Zhang, Li & Chen 2020), two in India (Marimuthu, Venkateswaran & Ramraj 2020; Purohit & Mehta 2020) and one in each of the following: Singapore (Ow Yong et al. 2020), South Korea (Park & Ha 2020), Saudi Arabia (Hassounah, Raheel & Alhefzi 2020) and Bangladesh (Biswas et al. 2020). Six studies were implemented in the United States (Brewer et al. 2020; Kim & Kreps 2020; Lambrecht 2020;

Sutton, Renshaw & Butts 2020; Wang, Hao & Platt 2020; Wieland et al. 2020) and another two in African nations – Nigeria (Ochu et al. 2020) and Ethiopia (Zikargae 2020). Lastly, only one study was conducted in a European state, namely in Spain (de Las Heras-Pedrosa, Sánchez-Núñez & Peláez 2020).

In terms of research design, most of the studies were descriptive and presented situation analyses in the form of case studies; however, there were also two intervention studies (Brewer et al. 2020; Wieland et al. 2020) and four observational ones (Liao et al. 2020; Ow Yong et al. 2020; Sutton, Renshaw & Butts 2020; Wang, Hao & Platt 2020). The source of data varied across studies, with a third of them relying on official reports or documents released by their respective authorities and another four considering various mass-media publications. Two studies investigated televised videos as part of the risk communication campaigns delivered by their local authorities (Purohit & Mehta 2020; Park & Ha 2020). Interestingly, five publications included in this review analysed the communication of risk via social media platforms (Liao et al. 2020; Marimuthu, Venkateswaran & Ramraj 2020; Sutton, Renshaw & Butts 2020; Wang, Hao & Platt 2020; de Las Heras-Pedrosa, Sánchez-Núñez & Peláez 2020). Three of the 18 studies investigated aspects of risk communication as applied to vulnerable groups: healthcare professionals (Ow Yong et al. 2020), African American communities (Brewer et al. 2020), and immigrant communities (Wieland et al. 2020). Target populations of the rest of the studies included either the general population or social media users in their respective countries.

Key constructs in communicating risk during COVID-19 pandemic

All included studies provided details regarding the implementation side of risk communication strategies utilized in their respective settings. However, information regarding essential constructs varied across publications, as outlined in *Table 1*.

Table 1: Types of information provided by each study

	Theory informed strategy	Evaluation methods	Message content	Mis-information handling	Strengths	Weaknesses	Opportunities	Threats	Cultural aspects	Political aspects	Economic aspects	Outcomes	Recommendations
No. of studies (n)	5	13	11	12	13	17	12	9	4	8	4	14	15
Biswas et al. 2020		x		x	x	x		x		x			x
Brewer et al. 2020	x	x	x	x	x	x	x		x			x	
Hassounah, Raheel & Alhefzi 2020		x	x	x	x	x	x			x		x	x
Hu & Qiu 2020	x			x	x	x	x			x			x
de Las Heras-Pedrosa, Sánchez-Núñez & Peláez 2020		x				x		x				x	x
Kim & Kreps 2020		x				x	x	x	x	x			x
Lambrecht 2020		x				x						x	x
Liao et al. 2020		x	x	x		x	x			x		x	x
Marimuthu, Venkateswaran & Ramraj 2020			x	x	x	x	x	x					x
Ochu et al. 2020	x		x		x	x	x	x	x	x		x	x
Ow Yong et al. 2020		x			x	x	x	x				x	x
Park & Ha 2020		x	x	x	x	x				x	x	x	x
Purohit & Mehta 2020		x	x	x	x	x	x		x			x	x
Sutton, Renshaw & Butts 2020		x			x	x	x				x	x	x
Wang, Hao & Platt 2020		x	x	x	x	x	x	x				x	

Wieland et al. 2020	x	x	x	x	x		x				x	x	
Zhang, Li & Chen 2020		x		x		x		x		x		x	x
Zikargae 2020	x		x	x	x	x		x			x	x	x

Communication Models and Evaluation Frameworks

Only five articles clearly specified whether communication strategies were informed by theory or evidence. Three communication frameworks were employed in these studies:

- Risk Communication and Community Engagement (RCCE) - (Hu & Qiu 2020; Zikargae 2020);
- Crisis and Emergency Risk Communication (CERC) - (Brewer et al. 2020; Wieland et al. 2020);
- Social and Behaviour Change Communication (SBCC) - (Ochu et al. 2020).

A third of the studies utilized theoretical frameworks for evaluating risk communication, including:

- Complex Adaptive System framework (Biswas et al. 2020);
- Systems Theory Framework (Kim & Kreps 2020);
- Survey based on CERC-framework (Ow Yong et al. 2020);
- Lasswell's SMCRE model (Sender, Message, Channel, Receiver and Effect) - (Park & Ha 2020);
- Seeger's Conceptual Model of Emergency Risk Communication (Purohit & Mehta 2020);
- Message-Centred Approach (Zhang, Li & Chen 2020).

Message Content

Advice regarding prevention practices against COVID-19 was by far the most frequently communicated type of message across all studies that reported on the contents of the messages delivered. Other risk-related information frequently offered included situation updates, general knowledge about the virus, policies and guidelines, reports of scientific research, public response, and support-seeking messages. Some studies specifically mentioned that these messages were action-oriented. However, only three articles reported that messages were modified according to feedback from recipients, as a result of a bidirectional communication between sender and their target audiences.

Mis-Information Management

Addressing the spread of inaccurate information, false news or myths were identified as an important concern across a multitude of settings. Engaging experts, alongside government representatives, in such efforts was clearly specified solely by two articles (Hu & Qiu 2020; Marimuthu, Venkateswaran & Ramraj 2020). Furthermore, two interventional studies implemented a bottom-up approach for managing this issue (Brewer et al. 2020; Wieland et al. 2020). On the other hand, there were reports of governments in Bangladesh and Saudi Arabia implementing coercive measures for managing rumours (Hassounah, Raheel & Alhefzi 2020; Biswas et al. 2020). Another four studies acknowledged this concern without clearly specifying how mis-information was handled.

Aspects relating to policy or politics

Eight articles offered some level of detail regarding how risk communication has been affected by politics. A lack of or ineffective coordination between government agencies was identified as a cause for increased spread of disease, false news and social instability. One study highlighted the risk of politicized communication channels (Kim & Kreps 2020), whilst another emphasized the politicization of risk itself (Liao et al. 2020), with authorities being blamed for failing to protect citizens. The outbreak preceded general elections or the political season in both South Korea (Park & Ha 2020) and China (Zhang, Li & Chen 2020). Accordingly, high value was placed on public opinion in these settings during the management of COVID-19 pandemic and thus decisions were reported to be based on potential impacts on public image and social stability.

Cultural Factors

Very few studies indicated that risk communication strategies implemented in their respective settings were culturally-responsive. Such factors were reflected mainly in the development of culturally-sensitive materials and messages.

Economic Aspects

Communication materials addressing economic issues were disseminated, mainly encouraging people to consume goods from local producers (Park & Ha 2020; Sutton, Renshaw & Butts 2020). As it followed an interventional design, one study encouraged communities to express their economic concerns (Wieland et al. 2020). Another publication celebrated the risk management progress achieved in spite of Ethiopia's scarce resources (Zikargae 2020).

Suggestions for Improvement

Most of studies offered recommendations for improving future efforts in communicating risk. Suggestions concerned three levels of action and are listed below.

I. Government-level actions

1. Base all public informing, policy, and decision-making on emerging scientific evidence
2. Mobilize resources early
3. Ensure inter-sectorial partnerships, cooperation, and coordination
4. Cooperate with key opinion leaders for communicating on social media platforms
5. Create direct communication channels with the public and request feedback
6. Ensure sustainability through funding risk communication actions and capacity-building activities within communities

II. Message-related

1. External communication should be proactive, timely, and responsive to public's concerns
2. Combat mis-information and make messages more accessible and comprehensible
3. Communicate early, clearly, and transparently in order to minimize confusion and fear
4. Experts should acknowledge uncertainty inherent in any pandemic
5. Utilize multiple communication channels, technologies, and formats
6. Incorporate appropriate sociocultural, economic, and political aspects

III. Considerations relating to target audiences

1. Community engagement strategies are cornerstone
2. Protect marginalized and vulnerable groups and address structural inequalities
3. Tailor communications to specific population segments
4. Empathize with target audiences and empower communities by also providing alternatives to preventive behaviours being recommended

SWOT Analysis

In order to better illustrate lessons learnt whilst communicating risk, a SWOT analysis was performed, incorporating data across all studies, and is presented in *Figure 2*.

SWOT Analysis

Internal		External	
Strengths	**Weaknesses**	**Opportunities**	**Threats**

Strengths

Messages
- Prompt release of accurate information and updates
- Tailored for different audiences and culturally-responsive
- Regularly evaluated and refined
- Bottom-up approach to their development
- Multiple communication channels and a variety of message delivery methods
- Acknowledging uncertainty

Resources
- Mobilizing resources
- Credibility and expertise of message communicators is essential
- Leveraging existing infrastructure within previously established partnerships
- Building on previous experience with communicating risk during other outbreaks

Social media
- Monitoring social media discussions for identifying and addressing mis-information
- Campaigns across different platforms in order to boost dissemination of messages

Government
- Early preparation through planning and strategy formulation
- Collaborating with key stakeholders for capacity building
- Engaging with stakeholders and communities
- Implementing adequate internal communication practices
- Gaining the public's trust through transparent messaging on risk
- Supporting vulnerable populations
- Monitoring informational needs of the public
- Rapid and regular evaluation throughout implementation

Weaknesses

Authorities
- Over-reassurance of the general population, underestimating the real threat
- Inconsistent and misleading messages resulting in confusion
- Not implementing feedback mechanisms
- Not engaging public health experts enough
- Local level being only involved in implementing strategies planned centrally
- Inadequate preparedness and organisation
- Lack of effective monitoring and evaluation mechanisms
- Failure to collaborate with other government agencies, internal stakeholders or other countries
- Authoritative communication system (top-down approach)
- Officials responding too slowly to crisis
- Politicizing COVID-19 risk
- Frequent changes of attitude across authorities
- Not acknowledging unpredictability
- Risk communication not being evidence-based

Messages
- Mixed messages which lead to misinformation and lack of adherence to prevention measures
- Lacking transparency and clarity (for example failing to define new or technical terms)
- Limited channels for communication accessible to the general population
- Not tailoring messages to high risk groups
- Insufficient messaging or not synchronised among states or different parts of the country

Opportunities

Digital technology
- Utilizing readily accessible and actively used technologies (including social media platforms)
- Performing analyses on risk communication delivered through social media by authorities

Communication strategies
- Engaging media companies for responding to public inquiries
- Adopting an empathic communication style for responding to increasing public emotions
- Recognizing and praising outbreak heroes for their contributions
- Promoting public awareness through local creative activities
- Utilizing communication channels appropriate for younger (modern technologies) and older audiences (traditional media) alike
- Previously established community partnerships could be used for effective risk communication, given their credibility and relationships with community members

Threats

Political context
- Lacking accountability and transparency in risk communication
- Authorities accusing and threatening healthcare professionals
- Public distrusting their government prior to the outbreak
- Lack of clear instructions and protocols delivered in real-time via direct communication channels
- Political aspects involved in health crisis response (e.g. elections)
- Extremists rebelling against protective measures and risk communication efforts
- Contexts with limited resources and multiple system-level barriers

Tolerance for uncertainty and other psychological factors
- Contradictions among specialists
- Rapid spread of myths, mis-information, and inaccurate or contradictory messages (information overload)
- Not offering psychological support
- Optimistic bias (when people believe that negative events are more likely to happen to others)

Figure 2: SWOT analysis for risk communication strategies implemented during COVID-19

Discussion

One year into COVID-19 pandemic, at the time of conducting the search strategy, numerous articles have been published on the topic of risk communication, reflecting its importance. Risk communication should be evaluated throughout its implementation in an attempt to improve its sustainability during the various phases of COVID-19 pandemic.

Across our sample of publications, risk communication has been implemented in a variety of ways. However, our analysis revealed weaknesses and limitations occurring throughout implementation regardless of the risk communication strategy utilized. This is in line with previous research evidence which suggested continuous updating of available risk communication resources (European Centre for Disease Prevention and Control 2013). Communicating risk during epidemics aims to promote behavioural modifications for greater adherence to control measures. However, Chichirez and Purcărea (2018) argue that behaviour change implies a high degree of complexity and, therefore, multiple theoretical frameworks are required for achieving planned outcomes.

On 23 December 2020, the World Health Organization (WHO) published an adapted and revised RCCE model (World Health Organization 2020), offering interim guidance specifically tailored to COVID-19 pandemic. This strategy presents four objectives: to be community-led, data-driven, collaborative, and to reinforce capacity and local solutions. Our results are in line with these recommendations and emphasize the importance of the four objectives. Effective community engagement and cross-sectoral as well as international collaborations were identified as strengths of external risk communication strategies. Across included studies, the need of basing risk communication on evidence and emerging data, as well as the importance of mobilizing and building on internal resources were also frequently recommended as areas requiring further improvement.

Only a third of included studies based their evaluation of risk communication on theoretical frameworks. The diversity of these conceptual evaluation tools, together with failure to clearly indicate how risk communication strategies were assessed reflects the real-world experience where such efforts are not sufficiently evaluated throughout implementation (Jardine 2008). Hence, evaluation methods and tools for risk communication were identified as a knowledge gap in this review. We suggest that a systematic review could provide best practices and resources in this regard.

The present review identified a range of key constructs in implementing risk communication strategies during COVID-19 pandemic. Various characteristics relating to messages were described as either an advantage or a limitation of communication efforts. For example, the value of communicating openly about the inherent unpredictability of COVID-19 pandemic was frequently identified in our analysis, similarly to what previous research has reported (Ratzan, Sommariva & Rauh 2020).

Mis-information was mentioned as one of the most significant and frequent threat to efficient risk communication. As much as two thirds of included publications mentioned the negative impact of fake news and rumours on COVID-19 risk communication, with some of them detailing how this information overload was managed in their respective settings. Managing mis-information during COVID-19 should be thoroughly integrated into risk communication strategies. The WHO developed a framework for addressing COVID-19 infodemic, proposing five action areas (Tangcharoensathien et al. 2020).

Our results further reflected the potential impact of sociocultural, economic and political aspects when communicating COVID-19 risk. On a few occasions, political figures were reported to either have offered inconsistent and misleading messages or have underestimated COVID-19 risk in the early phase of the pandemic, thus over-reassuring the general public. Political implications in external communication during COVID-19 health crisis have been described by other investigators who advocated for transparency, collaboration, and careful science-based communication (Gesser-Edelsburg & Hijazi 2020; Kreps & Kriner 2020; Ezeibe et al. 2020). Furthermore, we identified a need for developing communication interventions which are culturally-responsive and which take into consideration the economic impact of COVID-19 pandemic in a context-specific manner.

Our SWOT analysis synthesized lessons learnt from implementing risk communication strategies across the various settings included in this review. Despite not being able to rate their individual relevance for policy or practice, key implementation aspects transpired. Authorities which provided early messages on COVID-19 risk and addressed the pandemic through a cross-sectoral collaborative approach were recognized as strengths. Another important concept presented as an advantage by multiple studies was community engagement in implementing context-specific and acceptable risk communication (bottom-up strategy). Other strengths were categorized as being related to message-development, resource mobilization, and social media use. In terms of weaknesses, multiple limitations were described as pertaining to either messages or authorities; among which a slow response on behalf of governing agencies, as well as non-transparent communications.

Certain opportunities were presented as particularly relevant and these mainly outlined communication strategies. Utilizing digital technologies and social media platforms was identified as another significant enabler for implementation. Previous research has also suggested that social media may provide support in informing citizens during times of crises and emergencies (Jurgens & Helsloot 2018; Dijl, Zebel & Gutteling 2019). Hence, stakeholders should take advantage on the availability and accessibility of these modern communication channels and employ them for disseminating risk messages.

Discussions about political threats centred on authorities' accountability and transparency and public's distrust in their government prior to the outbreak. Trusting government communication has been associated with greater adoption of protective behaviours (Lim et al. 2021). Therefore, building public confidence in authorities is essential for external risk communication. Policy makers should also evaluate and avoid the risk of politicizing COVID-19 through their actions and communications. The present SWOT analysis could inform their objectives for improving the implementation of risk communication throughout this prolonged pandemic.

This study is subject to several limitations. The chosen methodology may have led to the omission of relevant sources of information, despite using multiple databases. Furthermore, text-papers, books, grey literature, and non-English studies were not included. Publication bias might have also occurred. The quality of evidence was not assessed in this review and consequently there may have been studies with suboptimal quality of data.

Conclusions

Despite its limitations, this study contributes to the knowledge basis on risk communication during pandemics and provides some practical insights into key considerations and recommendations when implementing strategies for communicating risk. Findings can inform planning of ongoing research that more systematically designs, implements, and evaluates risk communication during COVID-19 pandemic. Best practices in terms of evaluating the efficacy of risk communication during pandemics constituted a gap in available knowledge. This may be considered for the ongoing and future research agenda on risk communication. The dynamic nature of risk communication during COVID-19 is reflected in the SWOT analysis, which further emphasizes the need for adaptability and flexibility in implementing risk communication strategies in this context.

Acknowledgments

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