AstraZeneca Vaccine Controversies in the Media: Theorizing About the Mediatization of Ignorance in the Context of the COVID-19 Vaccination Campaign

Anna Sendra, Sinikka Torkkola & Jaana Parviainen

Published online: 26 Jan 2023.

Submit your article to this journal ↗

View related articles ↗

View Crossmark data ↗

Routledge
Taylor & Francis Group

AstraZeneca Vaccine Controversies in the Media: Theorizing About the Mediatization of Ignorance in the Context of the COVID-19 Vaccination Campaign

Anna Sendra [a], Sinikka Torkkola [a], and Jaana Parviainen [b]

aFaculty of Information Technology and Communication Sciences, Tampere University; bFaculty of Social Sciences, Tampere University

ABSTRACT

As is the case in other situations of deep uncertainty, the unknowns related to the COVID-19 pandemic have aroused a great deal of attention in the media. Drawing insights both from mediatization theory and ignorance studies, we discuss the coverage of the AstraZeneca vaccine controversies to develop a new concept that we call the mediatization of ignorance. In doing so, we conceptualize the procedure through which unknowns become mediatized as a three-step process that results from a combination of logics from the areas of politics, health, and science/industry. Moreover, we argue that the mediatization of ignorance may have promoted vaccine hesitancy at a moment when vaccination was crucial for addressing the COVID-19 pandemic. We conclude by suggesting the need to explore in further detail the role that ignorance plays not only in the management of the COVID-19 crisis but also in different areas of society.

Introduction

The still ongoing COVID-19 pandemic has been disrupting our societies since December 2019, when the first stories about an "unknown pneumonia outbreak" were reported by news media worldwide. While modern medicine is full of unknowns (Kerwin, 1993; Whooley & Barker, 2021), little is known about the impact derived from the circulation of these unknowns in news media during a health crisis. As Arfini (2021) points out, "ignorance shapes how and what knowledge is created, maintained and spread" (p. 4085). Considering the relevance of news media in situations of deep uncertainty (Hallin et al., 2020), the purpose of this paper is to discuss the consequences of disseminating the unknown through news media in the management of the COVID-19 pandemic. Drawing on insights from mediatization theory (Couldry & Hepp, 2013; Hepp et al., 2015) and ignorance studies (Gross & McGoey, 2015; Gross, 2021), we focus on analyzing AstraZeneca vaccine controversies in news media with the intention of answering the following questions: Was stopping the use of AstraZeneca a misstep? Did this decision contribute to increasing vaccine hesitancy? In doing so, we develop a new concept, the mediatization of ignorance, which is a process we see intertwined with other forms of mediatization, but also a phenomenon that has its own particularities. Adopting this perspective will provide us with valuable insights for addressing the (bio)mediated realities of the COVID-19 pandemic, especially in a moment of widespread circulation of misinformation and disinformation (Lovari, 2020).

Although the pandemic has generated other moments of uncertainty (e.g., confusion regarding face mask effectiveness, doubts about how the virus was transmitted), our paper focuses on the case of the AstraZeneca vaccine for various reasons. In terms of ignorance studies, discussing the coverage of the COVID-19 vaccination campaign is significant because the adverse effects of a vaccine can be considered part of the unknown. From the viewpoint of mediatization theory, vaccines as a case study are relevant for our conceptualization due to the growth of the anti-vaccination movement in recent years, especially on social media (e.g., Hernandez et al., 2021). Moreover, we center our analysis particularly around the AstraZeneca vaccine and not others (e.g., Johnson & Johnson) because AstraZeneca generated great interest in news media (Lupton, 2022). While journalists also reported information about the adverse effects of the Johnson & Johnson vaccine, more attention was given to the AstraZeneca vaccine, especially between March-April 2021. Similarly, the case of the AstraZeneca vaccine is easy to isolate as a separated example because, unlike other cases, vaccination is universal. Conversely, the recommendations on masking mentioned earlier are difficult to consider as a worldwide case due to the different rules that countries applied about its use.

The emerging field of ignorance studies has tried to fill the gaps, both theoretically and empirically, not only in understanding ignorance and non-knowledge but also in addressing how individual and collective actors can learn to deal with the unexpected and unknown in various sectors of society. Typically, researchers in this field (e.g., Gross & McGoey, 2015; Rescher, 2009; Vitek & Jackson, 2008) have challenged the traditional idea of ignorance as a mere lack of knowledge or as resulting from incomplete or poor knowledge processing, which could be cured through better knowledge-formation practices. Instead, ignorance is analyzed as an element that plays a major role in fomenting and entrenching hierarchies

among groups of people, marginalizing some forms of knowledge as less reliable than others. For instance, in the case of climate change, previous research has identified how ignorance is used reflexively "to reroute the discussion away from the need to engage in climate adaptation" (Bowden et al., 2021, p. 409). Regarding the COVID-19 pandemic, the idea behind the conceptualization presented below is to discuss through the case of the AstraZeneca vaccine how ignorance and its mediatization may have shaped the actions, interests, and policies of certain actors, both at the individual and collective levels. Particularly, we focus on the early stages of the COVID-19 vaccination campaign in Europe to define a new type of mediatization characteristic of moments of deep uncertainty.

Approximately one year after the COVID-19 crisis started, the pandemic entered a new phase in January 2021 when different vaccines started to be administered to the population. In Europe, five vaccines were authorized by the European Commission (n.d.) following the recommendations of the European Medicines Agency (EMA): BioNTech – Pfizer in December 2020; Moderna and AstraZeneca in January 2021; Johnson & Johnson in March 2021; and Novavax in December 2021. Once the first vaccine was authorized, European Union (EU) member states started to adopt different strategies to roll out the vaccines, dividing the population into subgroups according to several risk factors. Nevertheless, the vaccination process was destabilized in early March 2021 when several countries stopped using one of the vaccines available, AstraZeneca, to investigate its possible relationship with cases of blood clots (Wise, 2021). In addition to spark interest from the population, the announcement quickly spread through news media (Lupton, 2022), which generated debates about the safety not only of AstraZeneca but also of COVID-19 vaccines in general. Shortly after, and pending more studies, the EMA concluded in an initial review in early April 2021 that blood clots were an infrequent adverse effect of AstraZeneca; thus, some countries reinstated its use (Wise, 2021). However, the link between the vaccine and blood clots had already become a (bio)mediated reality (Hallin et al., 2020).

In the present study, we first describe how the news environment has influenced the management of the COVID-19 crisis, connecting the discussion according to different types of mediatization (mediatization of politics, biomediatization, mediatization of science). Second, we gather concepts from the field of ignorance studies to outline the relationship between news media, medicine, and the unknown. Third, we develop the mediatization of ignorance concept while highlighting its similarities and differences with other types of mediatization. Fourth, we discuss how the mediatization of ignorance in the case of the AstraZeneca vaccine may have had negative consequences for controlling the COVID-19 pandemic. The essence of our contribution is theoretical.

Mediatization and the COVID-19 pandemic

News media, or the type of mass media that disseminate news to the public, become a central actor during a health crisis like COVID-19 not only for the newsworthiness of the event (Hallin et al., 2020) but also because politicians, experts, and other relevant stakeholders rely on this type of mass media to disseminate information about the situation. By news media, in this paper we refer to both old and new media. Examples of old (traditional) media include newspapers, radio, or television – i.e., the so called Fourth Estate. Conversely, new media is described "as those digital media emerging from the convergence of computing, telecommunications and traditional media" (Pavlik, 1999, p. 54). Dutton (2009) argues that new media should be categorized independently (i.e., as the Fifth Estate) due to their potential of influencing in fresh ways politics, business, and other areas of society. Similarly, other types of mass media, such as entertainment and popular culture media, may also impact health-related decision-making processes of an individual (McGuire, 2021). For example, consider here the spike in streams of the movie *Contagion*, a film that discusses a pandemic, during the enforcement of the first stay-at-home orders of the COVID-19 crisis (Moore, 2020). However, it is beyond the scope of this paper to analyze the influence of entertainment and popular culture media in the management of the COVID-19 pandemic.

The relevance of the relationship between news media (hereafter, the media) and the COVID-19 crisis can be seen since early stages of the pandemic. For example, governments that held daily press conferences about the evolution of the crisis during its first months were the norm rather than the exception. Infographics including the basic protection rules (i.e., masks, hand washing, physical distance) were regularly shared by social media accounts of health departments at local, regional, and national levels of different countries. However, the constant coverage of the COVID-19 crisis generated an environment of information saturation that people have faced with anxiety and distress (Lupton & Lewis, 2021). This overload of information, in combination with the unknowns that have surrounded the pandemic, resulted in an "infodemic" where a "mix of facts, fears, rumors and speculations" (Lovari, 2020, p. 458) circulated through the media. Similarly, emerging diseases and their related uncertainty are also characterized as creating a situation where new (and sometimes conflicting) information is constantly released, which has also happened in the case of the COVID-19 pandemic. As Lupton and Lewis (2021) explain, effective communication strategies are needed to ensure that the population complies with the measures established to contain the spread of the virus in circumstances where news can change in a matter of hours.

Understanding the news environment of the novel coronavirus disease and how the crisis has been communicated requires analyzing the situation from a mediatization perspective. Couldry and Hepp (2013) explain that "mediatization is a concept used to analyze critically the interrelation between changes in media and communication on the one hand, and changes in culture and society on the other" (p. 197). With the enforcement of lockdowns and stay-at-home orders, people have had to make use of technologies for all kinds of activities, including work and social relationships. Therefore, mediatization research can help us understand how the logics of media have influenced these other domains (Hepp et al., 2015). When adopting a mediatization perspective, the media is not analyzed as an object that mediates, for example, between politicians and the public. Rather, the goal is to explore how politics and other areas of society, including health, have been affected by the way

the media works and how this influence is reflected in their practices (Hepp et al., 2015). In the case of the COVID-19 pandemic, politicians, particularly those with a government position (Besalú et al., 2021), have had to assume an active communication role. Nevertheless, politicians have not been the only spokespersons of the crisis. Other actors, including the CEOs of the pharmaceutical companies in charge of developing the vaccines, have also had to undertake communicative leadership during a moment full of unknowns.

Apart from contributing to the generation of the "infodemic," we argue that the intertwining of media logic with logics from different domains (specifically, politics, health, and science/industry) has given way to a new form of mediatization. Altheide (2013) explains that "media logic is defined as a form of communication, and the process through which media transmit and communicate information" (p. 225). For instance, the charts that the media have used to represent the evolution of daily SARS-CoV-2 infections are an example of media logic related to the pandemic. In any case, conceptualizing this new form of mediatization requires to briefly discuss the mediatization of politics (Strömbäck, 2008), biomediatization (Briggs & Hallin, 2016), and the mediatization of science (Väliverronen, 2021) separately. As outlined in the following, these three types of mediatization have altered the management of the COVID-19 pandemic even before the virus received an official name.

Mediatization of politics

Mediatization of politics corresponds to the intertwining of media logic with political logic (Strömbäck, 2008). Strömbäck (2008) particularly sees it as a four-phase process where the media assume a more central role the further the process goes. In a later work, Strömbäck and Esser (2014) add that political logic can be divided into three areas: polity ("the system of rules regulating the political process," e.g., the constitution of a country); policy ("the processes of defining problems and forming and implementing policies within a certain institutional framework," e.g., the parliament); and politics ("the processes of garnering support for one's candidacy, party or political ideas," e.g., the elections; p. 249). In this context, tensions may arise not only among polity, policy, and politics, but also between media logic and political logic (Strömbäck & Esser, 2014).

If we contextualize the COVID-19 pandemic according to the mediatization of politics, it could be said that the crisis was not only heavily politicized but also profoundly mediatized from the start. Particularly, parties in government have experienced strains between policy and politics since the adoption of the first measures to contain the pandemic (Parviainen et al., 2021). That is, in a situation of deep uncertainty, those in power had to make quick decisions about restrictions to preserve the health of the population without knowing how the steps taken could impact their position in government. The case of the AstraZeneca vaccine is no exception to these tensions, as countries quickly withdraw the vaccine from the vaccination campaign after the first cases of blood clots were reported (Wise, 2021). Previous studies suggest that countries made these decisions adopting postures that range from

epistemic humility in Finland (Parviainen et al., 2021) to (non)governance in Brasil (Ortega & Orsini, 2020). Similarly, media logic has also ruled the political management of the crisis from the early stages of the pandemic. For instance, the media in Spain have often announced future restrictions to the public before the government did. These leaks, executed by politicians before the official press briefings, exemplify the existing tension between media logic and political logic. In turn, this scenario possibly situated the COVID-19 pandemic between the third and fourth phases of the mediatization of politics (Strömbäck, 2008). This means that, on many occasions, people had no other choice but to act on (bio)mediated realities due to the level of independence that the media achieved (Strömbäck, 2008).

Biomediatization

Biomediatization corresponds to the intertwining of media logic with the logics of biomedicine (Briggs & Hallin, 2016). Although biomediatization is not as well researched as the mediatization of politics (Hallin et al., 2020), evidence shows that the way health news is constructed has the potential to influence health-related public policies (Briggs, 2020). In this context, previous research suggests that health news mainly adopts three perspectives (Briggs & Hallin, 2010). These include the medical authority model (i.e., health professionals are the only ones that can provide medical information); the patient – consumer model (i.e., health professionals and patients work together); and the public sphere model (i.e., patients, or citizens, can participate in the discussion of health issues; Briggs & Hallin, 2010). The most prevalent of the three is the patient – consumer model (Briggs & Hallin, 2010), and, as in the case of the mediatization of politics, tensions may also arise between these different perspectives (Briggs & Hallin, 2010; Hall & Wolf, 2021). The problem remains that the intertwining of media logic with biomedicine logic is (ill)balanced in nature because, while news can be created and published in a matter of hours, the production of scientific knowledge takes more time, thus exacerbating the process of mediatization. Hallin et al. (2020) explain this mismatch as follows:

> "Common sense" tells us that health knowledge is produced first in the realm of biomedical science, and then later transmitted by health institutions and professionals through various channels, including the mass media. However, epidemics are often created into objects of mediated public knowledge before they have been consolidated as objects of biomedical knowledge. (p. 2)

In the case of the COVID-19 crisis, it is too early to say which of the models of biocommunicability established by Briggs and Hallin (2010) has been the most prevalent when communicating about the pandemic. Future studies can focus on analyzing this aspect, but initial evidence points toward a strong reliance on experts (Lupton & Lewis, 2021), at least in countries in the Global North. In any case, what seems clear so far is that the news reporting of this emerging disease bears similarities with the coverage of previous epidemics, such as the 2009 swine flu pandemic (Hallin et al., 2020). For example, the appearance in early 2020 of multiple stories about a "mystery virus" demonstrates how the news reporting of the COVID-19 pandemic

was mediatizing the novel coronavirus disease even before COVID-19 itself was established as such (Briggs, 2011). In a way, this process constituted a "virtual" epidemic (Briggs, 2011), which, in the case of the 2009 swine flu pandemic, contributed to overestimating the threat to be confronted (Dingwall et al., 2013). Time has shown in the case of the COVID-19 pandemic that the danger was not overestimated. However, the question remains: Did the constitution of a virtual epidemic resulting from the process of biomediatization contribute to diminishing people's trust in health authorities and making them engage in risky behaviors (Dingwall et al., 2013), such as not wearing a mask or refusing to take the vaccine?

Mediatization of science

Mediatization of science corresponds to the intertwining of media logic with science logic (Väliverronen, 2021). Understanding this process requires framing science from a social perspective, which involves both the knowledge itself and the cultures around its production (Konkes & Foxwell-Norton, 2021). The way universities are increasingly generating science is an example of this type of mediatization. According to Väliverronen (2021), findings are no longer reported only to scientific journals, but results may also appear in the media even before a paper has completed the peer-review process. Media logic, therefore, becomes part of the scientific method. Considering the publication timings of scientific journals, the mediatization of science shares similarities with the process of biomediatization. Likewise, the mediatization of science gives way to promotional culture, where higher education institutions are increasingly governed by rankings and PR-related indicators (Väliverronen, 2021). That is, science is produced not only with the mentality of increasing the likelihood of funding opportunities of individual researchers (Nölleke et al., 2021), but also of maintaining universities in a position of "excellence" according to market criteria (Väliverronen, 2021). While Väliverronen (2021) discusses the mediatization of science from the perspective of universities, this type of mediatization can also be present in the production of scientific knowledge that comes from other organizations (e.g., pharmaceutical industry). For example, in the case of private companies, promotional culture may be exacerbating existing pressures (e.g., commercialization). However, defining the mediatization of science in relation to other processes of scientific knowledge production is outside the reach of this paper.

It remains open whether treating science as a commodity may have influenced the management of the COVID-19 pandemic since the crisis has also been heavily mediatized in terms of science. A proof of this type of mediatization is the number of preprints that were available in repositories less than a month after the COVID-19 pandemic started (Brierley, 2021). In the case of the AstraZeneca vaccine, a similar phenomenon took place after countries stopped using it in early March 2021 (Wise, 2021). For example, between March-April 2021, a total of 165 preprints were deposited in the health sciences server medRxiv, which is almost double the number of preprints (n = 86) deposited between January-February 2021[1]. Brierley (2021) explains that the large availability of preprints made science about the SARS-CoV-2 virus more open and accessible to other researchers from the early stages of the crisis. However, "the non-peer-reviewed nature of preprints has proven to have limitations as well as benefits, allowing conclusions without scientific support to filter through various media channels in several notable cases" (Brierley, 2021, p. e115). While the academic community itself acted as a gatekeeper of problematic claims based on imprecise science, which in some cases ended in the withdrawal of the published preprints, this was not enough to avoid the mediatization of said affirmations (Brierley, 2021). Were some of these studies rushed due to the pressure of promotional culture? The answer to this question may be unobtainable, but the phenomenon of preprints suggests that the production of science during the pandemic has been influenced by mediatization processes.

Medicine, unknowns, and news media

Although we live in an era when expert knowledge in health care has advanced significantly compared with 50 years ago, partly due to technological innovations, in medicine there are always new unknowns to discover. Kerwin (1993) classified these unknowns in different types, including: known unknowns, unknown unknowns, errors, tacit knowing, taboos, and denials. Despite this categorization, most unknowns in medicine are known unknowns, which are factors that are not understood yet but that health professionals are aware of (Kerwin, 1993; Whooley & Barker, 2021). For example, consider rare diseases. Health professionals know that each of these conditions has a cause, but in most circumstances, they have not been able to determine what those causes are. Similarly, known unknowns can be classified as temporary (Parviainen et al., 2021) because research about them will eventually transform known unknowns into knowledge. This reasoning can also be applied to the COVID-19 pandemic. When the first news about the novel coronavirus disease appeared in the media between December 2019 and January 2020, expressions including "mystery virus" and "unknown pneumonia outbreak" were constantly used by journalists. However, as research progressed, a name was given to the "mystery virus" (SARS-CoV-2), and the "unknown pneumonia outbreak" was established as a new disease (COVID-19). Details about its symptoms were also slowly revealed over time (fever, dry cough, etc.). Therefore, from an epistemological perspective, it could be said that known unknowns about the novel coronavirus disease temporarily circulated through the media at different moments of the crisis.

In the literature on ignorance studies, known unknowns are understood as uncertainties whose existence we can identify, even if we do not know what they really are (Gross, 2019). The unfolding of the COVID-19 pandemic between late 2019 and early 2020 is an example of these uncertainties, as experts quickly recognized that something was getting people sick, even though they did not know at the time what it was. When the vaccination campaign started, vaccine adverse effects also entered the realm of these uncertainties. In both cases, epistemic actors can develop active and passive attitudes about how they relate to potentially knowable or unknowable phenomena. As Gross (2019) reminds us, active operations

(e.g., strategies, modeling, scientific research) differ from passive intentionality, where unknowns are deliberately left unspecified. Conversely, unknown unknowns (e.g., natural disasters, accidents) cannot be anticipated, which means that they can only be outlined retrospectively (Daase & Kessler, 2007; Whooley & Barker, 2021). The bottom line is that unknowns cannot be eliminated entirely; thus, they are an essential component that constantly structures and influences societies and economies (McGoey, 2019). The objective of acknowledging the unknown "is not to overcome ignorance, but to develop possibilities for decision-making in spite of not knowing" (Gross, 2021, para. 7). As for the COVID-19 pandemic, what seems clear is that the way politicians and other relevant stakeholders handled the unknown, in combination with strong media use by the population, has contributed to the creation of (bio)mediated realities at different times during the crisis.

In this context, the COVID-19 crisis is certainly not the first epidemic in which known unknowns have been disseminated through the media. With previous emerging diseases, such as the swine flu pandemic in 2009, experts were also faced with unfamiliar situations (Hallin et al., 2020). Nevertheless, the COVID-19 pandemic is the first that has taken place in a unique communication and political environment, characterized by the rise of populism and nationalism (Horolets et al., 2020; Lupton, 2022). Both Eyal (2019) and Lupton (2022) agree that this crisis of expertise, in which trust and risk have played a particularly important role, has been in the making over recent decades. For example, in terms of risk, Eyal (2019) suggests that issues managed from this perspective (e.g., climate change) "typically overflow the current state of knowledge, leaving large margins of uncertainty into which many different groups may enter with claims to expertise" (p. 67). Considering that many of the decisions related to the COVID-19 crisis have been made according to the risk of infection, this reasoning can also be applied in the case of the pandemic. Therefore, it should not be surprising that highly educated experts, such as epidemiologists and virologists, have constantly faced distrust from the public regarding protective measures or the vaccination process (Lupton, 2022). At times, the mistrust of the population has even materialized in protests that spread to many capitals worldwide, where the existence of the virus itself has been questioned.

Against this background, a technology that has particularly fueled the crisis of expertise is social media and its machine-learning algorithms. In the case of the COVID-19 crisis, these online platforms seem to have promoted connections between what otherwise would be sparse communities, thus strengthening the distribution of conspiracy theories related to the pandemic (Shahsavari et al., 2020). Previous research suggests that this phenomenon may have diminished the trust that people had in health authorities (Van Dijck & Alinejad, 2020). Moreover, the increasing use of social media has influenced not only knowledge construction processes related to health but also those connected with politics or the environment – resulting, for example, in the rise of populism (Engesser et al., 2017). In terms of circulation, the particularity of these online platforms lies in the fact that any individual can acquire and distribute knowledge. However, not all knowledge found

through social media is reliable, like in the case of the COVID-19 pandemic (Shahsavari et al., 2020). A related issue is that not everyone participates equally in the debates that take place through these online platforms. For example, in a preliminary analysis of 1 million tweets related to the COVID-19 vaccination campaign, Hernandez et al. (2021) identified that the medical community in general continues to avoid the use of social media in their work practices. Similarly, social media is a place where people can also acquire and distribute the unknown in the absence of knowledge. Although known unknowns are not unreliable on their own, we argue that they can become misinformation if their circulation is maintained over time once knowledge about a particular topic has been established.

The mediatization of ignorance

Considering the above discussion, the AstraZeneca case is a clear example of how a known unknown of the vaccine was mediatized in the process of waiting for more evidence. While the blood clot risk eventually became knowledge thanks to scientific research (Wise, 2021), this case shows how what was being mediatized at the beginning was not knowledge about the vaccine but its unknowns (known unknowns). The process where unknowns end up mediatized is what we call the *mediatization of ignorance* (Figure 1). This type of mediatization results from a combination of media logic with logics from the areas of politics (e.g., politicization), health (e.g., biocommunicability) and science/industry (e.g., promotional culture) (Briggs & Hallin, 2010; Strömbäck & Esser, 2014; Väliverronen, 2021). On one hand, the main difference we see between the mediatization of ignorance and other types of mediatization is that while the latter involves the mediatizing of knowledge, the first entails the mediatizing of unknowns (known unknowns). On the other hand, the mediatization of ignorance should be understood as a temporary phenomenon that becomes other types of mediatization (mediatization of politics, biomediatization, and mediatization of science) once unknowns are transformed into knowledge. In this context, the appearance of AstraZeneca vaccine controversies in the media is not the only moment when unknowns have been mediatized, as the pandemic has generated a situation of constant uncertainty. Therefore, the mediatization of ignorance is a process that is also repeatedly intertwined with other types of mediatization because, in the case of emerging diseases like COVID-19, new unknowns will continue to appear. The problem remains "whether one can predict when and how ignorance gets out of control and starts having negative consequences" (Horolets et al., 2020, p. 745).

In the same way that knowledge is power, Parviainen et al. (2021) argue that non-knowledge is also a source of power that should be appreciated and analyzed as such. For example, previous research has found that ignorance can be used strategically (McGoey, 2012) and in connection with health risks, such as the intake of calories (Nordström et al., 2023). Evidence from this study indicates that one out of two participants chose to remain ignorant about the calories in their meals, which led them to consume more calories in comparison to participants who knew the information beforehand (Nordström et al.,
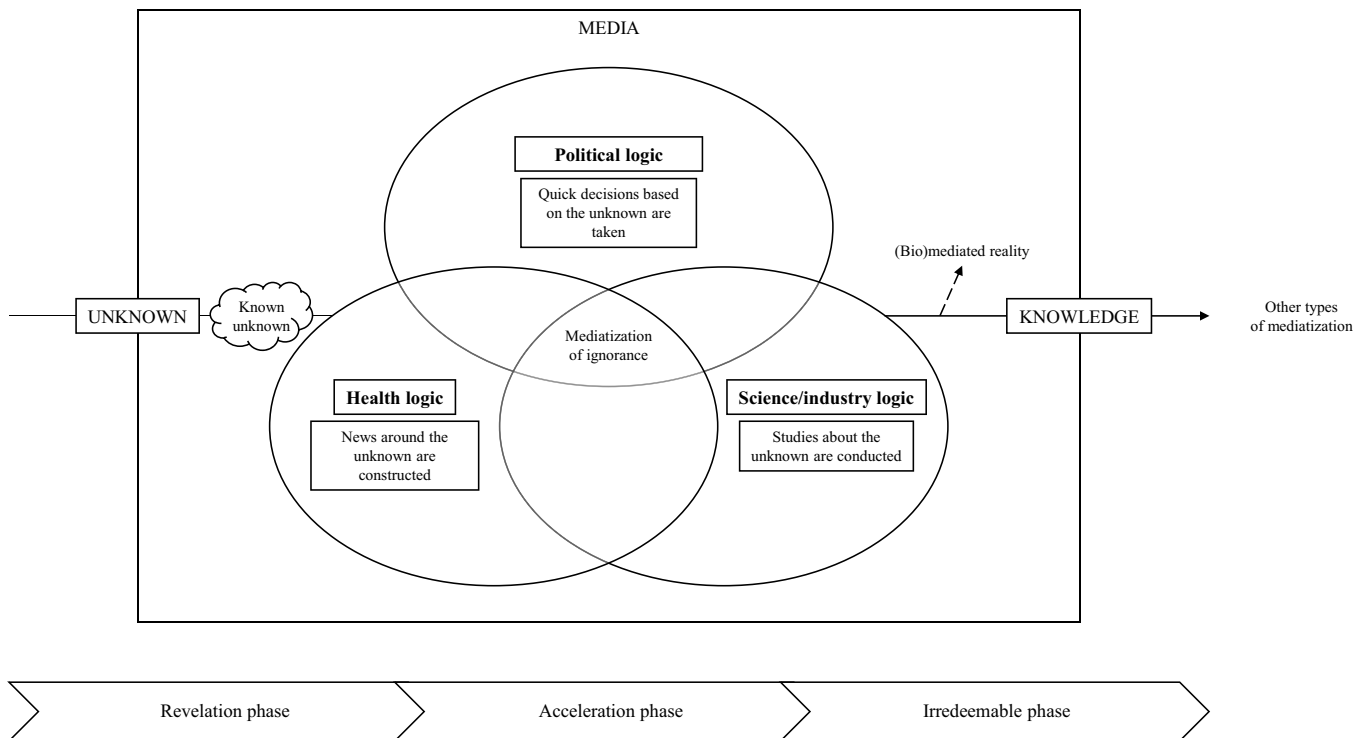
Figure 1. Mediatization of ignorance during the COVID-19 pandemic. *Note.* Unknown here refers to all the unknowns in medicine, while known unknowns refer to a specific type of unknowns (e.g., vaccine adverse effects).

2023). Therefore, exploring how the unknown is constructed in relation to media logic becomes a rich area of analysis for understanding not only the "infodemic" linked to the COVID-19 pandemic but also the effects of non-knowledge in society. One could argue that unknowns have always been part of other mediatization processes, since Briggs (2011) explains in the case of biomediatization that "[m]ediatizing health requires ignorance" (p. 220). Similarly, the mediatization of ignorance could also be analyzed in relation to deep mediatization (Hepp, 2020) if we consider the rapid implementation of digital services at the beginning of the COVID-19 crisis. However, in this paper we see it as an independent process that complements other types of mediatization. For this reason, our conceptualization comes from an institutionalist tradition present in mediatization research (Hepp, 2020), where the unknown should be understood as another area of society that can be influenced by dynamics related to the media.

Moreover, the mediatization of ignorance should not be seen as a motionless process. Influenced by Strömbäck's (2008) work on the mediatization of politics and its phases, we suggest that there are three steps in the process of mediatizing the unknown: (1) the revelation phase; (2) the acceleration phase; and (3) the irredeemable phase. First, in the revelation phase, a known unknown is revealed to the media. In this phase, media logic does not dominate the discourse around the known unknown, but the actors who execute communicative leadership (politicians, health professionals, researchers, etc.) are still in control of the situation. For example, this phase took place when Austria announced in March 2021 an investigation between the AstraZeneca vaccine and the death of

a person (Wise, 2021). Second, in the acceleration phase, the known unknown is widely disseminated to the population. In this phase, the known unknown becomes a (bio)mediated reality while the public waits for scientific evidence. That is, the actors who execute communicative leadership start to lose control of the situation in favor of the media, who further mediatize the known unknown. This phase took place, for instance, when countries withheld the use of the AstraZeneca vaccine after more cases of blood clots appeared in the EU (Wise, 2021). Third, in the irredeemable phase, media logic dominates the discourse around the known unknown. In this phase, the (bio)mediated reality cannot be reversed because the actors who execute communicative leadership lose all control of the situation, even though they may have already obtained the necessary scientific evidence. For example, this phase took place after the EMA issued the initial report about the AstraZeneca vaccine, which recommended its use again (Wise, 2021).

Another precedent that can help us illustrate the three phases of the mediatization of ignorance is the case of the hydroxychloroquine (HCQ) drug, which was used early in the pandemic as a potential treatment for COVID-19 (Meyerowitz et al., 2020). First, in the revelation phase, it was disclosed to the media that HCQ could help treat COVID-19 patients following few reports that suggested initial evidence of its efficacy (Meyerowitz et al., 2020). Second, in the acceleration phase, the attention on HCQ as a treatment for COVID-19 spiked around the globe, especially after being publicly endorsed by Donald Trump, the former president of the United States (Marcon & Caulfield, 2021). Despite the lack of robust evidence and the controversies surrounding these first

reports (Marcon & Caulfield, 2021; Tang et al., 2021), the idea that HCQ could help treat COVID-19 patients became a (bio)mediated reality, to the point that there was a temporary shortage of the drug (Tang et al., 2021). Third, in the irredeemable phase, evidence from multiple trials concluded that treating COVID-19 patients with HCQ was not providing any benefits, thus recommending against its use (Tang et al., 2021). However, the link between HCQ and COVID-19 was already created, and this (bio)mediated reality became one of the most circulated pandemic-related fake news in the media, especially through online environments (Marcon & Caulfield, 2021).

Toward an understanding of the mediatization of ignorance

In health contexts, Briggs (2011) suggests that mediatization starts before a risk has been identified, which has also happened in the case of the COVID-19 vaccination process. For example, a study in the UK identified that part of the population questioned the vaccines due to how quickly they were developed (Lockyer et al., 2021), citing negative experiences or concerns about safety. However, the problem with the mediatization of known unknowns related to the AstraZeneca vaccine is not that the blood clot risk became a (bio)mediated reality. Rather, the mediatization of this known unknown gave anti-vaxxers the opportunity to generate hermeneutical domination (Santos, 2021) against any new evidence that proved that the blood clot risk associated with AstraZeneca was in fact low. That is, anti-vaxxers strategically used the unknown (McGoey, 2012) to promote their narrative and transform the blood clot risk into misinformation. This phenomenon took place especially in social media, as these online platforms have the capability to form both echo chambers and epistemic bubbles (Nguyen, 2020). In this context, Santos (2021) points out that "in an echo chamber, epistemic inputs from nonmembers are actively rejected or excluded in favor of internal inputs (inputs from members)" (p. 110). Therefore, it is possible that the mediatization of this known unknown promoted vaccine hesitancy among the population, as Strömbäck's (2008) explains that people act on (bio)mediated realities against the lack of alternatives.

The case of the AstraZeneca vaccine shows how, at a time when communication was key to managing the pandemic, the strategies in place failed, and the "infodemic" continued to spread out of control among the population. In this context, the phenomenon of vaccine hesitancy related to the COVID-19 crisis may also be the result of pluralistic ignorance (Chevallier et al., 2021). Chevallier et al. (2021) explain that pluralistic ignorance "occurs when people underestimate or overestimate the frequency of a given behavior in the population" (p. 333), such as the influence of echo chambers when deciding whether or not to take a vaccine. According to this type of ignorance, it is possible that politicians and other relevant stakeholders who executed communicative leadership during the pandemic underestimated the power of hermeneutical domination that takes place in online environments. The question remains: How can leaders counteract the narratives that transform known unknowns into misinformation? This inquiry does not have a unified answer. For example, while Hall and Wolf

(2021) recommend "fighting mistrust with transparency" (p. 330), Eyal (2019) argues that transparency may not always be the best solution when addressing the lack of trust in scientific knowledge.

Despite the growing body of literature in health communication that is exploring how to address the problem of mistrust and misinformation (e.g., Chia et al., 2021), defining misinformation itself remains a complex issue (Krishna & Thompson, 2021). Earlier research on politically based misinformation distinguishes between three types of people: the informed (i.e., those who hold accurate beliefs), the uninformed (i.e., those who do not hold beliefs) and the misinformed (i.e., those who hold inaccurate beliefs) (Kuklinski et al., 2000). Krishna and Thompson (2021) add that those who we would classify as misinformed hold inaccurate beliefs because they "evaluate such data to be useful to their problem-solving efforts" (p. 324). As described above, the unknown per se is not misinformation, but non-knowledge, which would categorize individuals as uninformed (Kuklinski et al., 2000). Instead, it is the mediatization of ignorance what would categorize some of these individuals as misinformed (Kuklinski et al., 2000) by transforming the unknown into misinformation. Therefore, incorporating the theoretical construct of the mediatization of ignorance in future health communication research would provide a more nuanced understanding of how misinformation is generated. As we have tried to show throughout the paper, the spread of misinformation starts before knowledge has been established, which could have potential consequences for health communication. For example, if we want the population to adopt a behavior change (e.g., get vaccinated) using the health belief model (Champion & Skinner, 2008), the promotion of said change will not work if from the start people hold inaccurate beliefs. One of the ways Krishna and Thompson (2021) define health misinformation is "acceptance of false or (scientifically) inaccurate data as useful [...] in the absence of accurate data or messages to the contrary" (p. 321). Answering to their call on further research to elaborate on this description (Krishna & Thompson, 2021), we believe that the theoretical construct of the mediatization of ignorance could be a good starting point for future studies on misinformation and health communication.

Furthermore, we argue that the case of the AstraZeneca vaccine situated the pandemic in the irredeemable phase. The COVID-19 crisis generated a situation of deep uncertainty that required fast answers in which the (bio)mediated reality of the blood clot risk became the main narrative in the media because the actors who executed communicative leadership struggled to manage this known unknown. In this context, Nair and Howlett (2017) explain that "inaction, delayed action or wrong policy action due to incomplete information and uncertainties about the future can lead to policy failure" (p. 112), which in the case of the pandemic may have resulted in an increase in vaccine hesitancy. However, working to avoid what Nair and Howlett (2017) call policy myopia requires further analysis due to the complexity of the COVID-19 crisis. In addition to enhance the way health information is communicated, such as adapting it to modern modes of communication (Van Dijck & Alinejad, 2020), there are also different factors that potentially impact people's trust on health authorities. For

example, one way to frame the population's mistrust of experts' recommendations is that most people are unaware of how science works (Kerwin, 1993; Solomon, 2021). Other social determinants of health, like discrimination or the differences in working conditions, are elements that may also interfere with public's trust in experts (Lupton, 2022). Similarly, another issue to consider is related to the concept of health citizenship, which highlights the relevance of lay perspectives in producing expert knowledge (Hausman & Tech, 2017). Only then policy-makers would have the opportunity to gain a deeper understanding of the arguments people have in favor of or against vaccination.

Likewise, we cannot discuss biocommunicability without considering the Foucauldian concepts of biopower and biopolitics (Taylor, 2014) and their relationship to mediatization. For several authors, the COVID-19 pandemic is a clear example of biopolitics (e.g., Ecks, 2020; Latour, 2020). According to these studies, states around the world executed their biopower and quickly enforced lockdowns and other restrictive measures to manage the crisis (i.e., the population), decisions that were mainly driven by epidemiological data about the virus. Ecks (2020) even argues that the extreme response of governments in the face of a fear of health collapse marked the birth of radical biopolitics, where "population health becomes the supreme value and economic wealth becomes subservient to it" (para. 5). However, the execution of this kind of governance cannot be understood without the media. As Hall (2021) points out, communication in times such as the COVID-19 pandemic has biopolitical capabilities, as messages issued by the authorities are used not only to provide guidance to citizens but also to control them. That is, messages – and therefore the media – help governments define and transmit what being a responsible member of the population consists of in the eyes of the state (Cook et al., 2021; Hall, 2021). For example, descriptions of good citizens since the early stages of the pandemic have included wearing masks, practicing hand washing, and maintaining physical distance. This definition later widened to add being vaccinated to the list of individual responsibilities.

At the same time, those who have not followed these rules have been deemed reckless and selfish. States have even implemented mechanisms of punishment to correct these behaviors, such as the imposition of fines on anti-vaxxers. While the COVID-19 crisis is a good example of the disciplinary society described by Foucault (Feder, 2014; Taylor, 2014), McGuire (2021) explains that the population has been less docile than Foucault anticipated. This author indicates that, "[r]ather than conditioning us to follow unquestioningly the directives of public health authorities, months of lockdown have instead produced a kind of disease with authority" (McGuire, 2021, p. 54). Therefore, behaviors such as not wearing a mask or refusing to be vaccinated could be read as acts of resistance toward biopolitical governance, which Foucault considers to be power statements on their own (Feder, 2014). Still, it is necessary to understand in further detail how these acts of resistance are generated. Lupton (2022) observes that refusing to be vaccinated should not be categorized as an act of resistance when the decision is influenced by social determinants of health, whether economic or otherwise. Conversely, previous research on vaccine hesitancy suggests that individual

expressions of (bio)power may be the result of modern (i.e., online) forms of health citizenship, which generate broader accessibility to all kinds of knowledge (Hausman & Tech, 2017). Considering the process of the mediatization of ignorance described in this paper, it is possible that its combination with modern forms of health citizenship increased the acts of resistance based on unknowns and misinformation toward the biopolitical governance of the COVID-19 pandemic.

To summarize and revisit the questions outlined at the beginning of this paper: Was stopping the use of AstraZeneca a misstep? Did this decision contributed to increasing vaccine hesitancy? In the case of the first question, from the perspective of public health, the answer is no because the decision was made to protect the health of the population. However, the misstep was in ceasing the rollout of the vaccine without implementing a coordinated communication strategy (Wise, 2021) aimed at reducing the effects of the "infodemic." Instead, as we outlined throughout the paper, logics from different areas of society (politics, health, science/industry) intertwined and ended up influencing how the relevant actors informed the public about the decision, thus increasing the confusion of the population. In the case of the second question, our discussion suggests that the decision to stop using the AstraZeneca vaccine possibly contributed to increasing vaccine hesitancy. Failed communication resulted in the mediatization of the blood clot risk, initially a known unknown, which was used by certain agents with the aim of maintaining ignorance around the AstraZeneca vaccine. In this context, Parviainen and Lahikainen (2021) explain that "the repetition of (dis/mis) information in various media is recognized to render an argument more reliable in the eyes of receivers, regardless of whether the argument is true or not" (p. 3882). Considering the "infodemic" that has surrounded the COVID-19 pandemic from the early stages of the crisis, this may be what happened in the case of the AstraZeneca vaccine.

Conclusion

As in the case of previous pandemics, the unknowns of the novel coronavirus ended up influencing the management of the crisis, including how updates about the situation have been communicated to the population. This paper has approached AstraZeneca vaccine controversies in the media through a combination of mediatization theory and ignorance studies, with the objective of discussing the consequences of disseminating known unknowns to the population. It has been argued that a combination of logics from the areas of politics, health, and science/industry laid the foundation for a new type of mediatization called the mediatization of ignorance. Starting from the case of the AstraZeneca vaccine, this paper argues that the mediatization of ignorance can be understood as a three-step process that likely increased vaccine hesitancy at a time when vaccination was crucial to reach the end of the crisis. In this context, while it may not be possible to prevent the mediatization of ignorance in situations of deep uncertainty, steps can be taken to mitigate its consequences. At population-level, it seems crucial to provide people with the necessary skills to manage the vast amount of information available in the

media during a health crisis like COVID-19, especially in terms of social media (Hernandez et al., 2021; Shahsavari et al., 2020). Nevertheless, when framed from the perspective of biopolitics, addressing this problem seems to be more complex than just enhancing the literacy of citizens regarding media and health (Hausman & Tech, 2017). Similarly, our discussion suggests that for those who execute communicative leadership it seems imperative to acknowledge the potential of the unknown and receive training on how to appropriately manage and communicate non-knowledge. As Whooley and Barker (2021, p. 281) claim, once the COVID-19 pandemic is over "we cannot lose sight of its hard-won lessons of the role of ignorance and uncertainty in health, illness, and medicine."

Despite the valuable insights provided in this document, the paper should also be understood as having some limitations. On one hand, this is a theoretical contribution that lacks empirical evidence; thus, the discussion provided can only be read as a hypothesis about the situation described. Further research should analyze the mediatization of ignorance by adding empirical data about how the controversies of the AstraZeneca vaccine were communicated by different actors. On the other hand, this paper has framed the use of social media mostly from a negative perspective. However, the interactions that happen in these online platforms are what made it possible to determine the existence of long COVID (Callard & Perego, 2021). Many health institutions at local, regional, and national levels also relied on social media to quickly disseminate knowledge about the pandemic (e.g., regarding restrictions or testing guidelines). When experts use these online platforms for distributing reliable information, Van Dijck and Alinejad (2020) argue that social media can be one of the solutions for tackling the crisis of expertise. Therefore, this ambivalent potential means that future studies should explore the role of these online platforms for knowledge construction processes in further detail. Furthermore, another aspect that has not been discussed in this study is the politicization of the vaccines themselves (Hall & Wolf, 2021), which has exacerbated existing health inequalities between the Global North and the Global South. Regardless of these weaknesses, we believe that theorizing about the mediatization of ignorance opens new avenues to better understand how the unknown influences different areas of society, including the management of the COVID-19 crisis. Only by exploring the power that ignorance holds can authorities and other relevant actors fully address the "infodemic" that has accompanied the pandemic.

Note

1. Data extracted from medRxiv (https://www.medrxiv.org/), using the term AstraZeneca and limiting the search between 1 January 2021–28 February 2021 and between 1 March 2021–30 April 2021.

Acknowledgements

Disclosure statement

Funding

ORCID

Anna Sendra 🆔 http://orcid.org/0000-0001-7069-1378
Sinikka Torkkola 🆔 http://orcid.org/0000-0002-1150-6627
Jaana Parviainen 🆔 http://orcid.org/0000-0002-7838-592X

Author contributions

Anna Sendra: conceptualization; writing – original draft; writing – review and editing. Sinikka Torkkola: conceptualization; supervision; writing – review and editing. Jaana Parviainen: conceptualization; supervision; writing – review and editing.

References

Altheide, D. L. (2013). Media logic, social control, and fear. *Communication Theory*, 23(3), 223–238. https://doi.org/10.1111/comt.12017

Arfini, S. (2021). Situated ignorance: The distribution and extension of ignorance in cognitive niches. *Synthese*, 198(5), 4079–4095. https://doi.org/10.1007/s11229-019-02328-0

Besalú, R., Pont-Sorribes, C., & Martí, A. (2021). Perceived credibility of tweets by opinion leaders during the COVID-19 pandemic in Spain. *International Journal of Communication*, 15(2021), 5158–5185. https://ijoc.org/index.php/ijoc/article/view/17743

Bowden, V., Nyberg, D., & Wright, C. (2021). "I don't think anybody really knows": Constructing reflexive ignorance in climate change adaptation. *The British Journal of Sociology*, 72(2), 397–411. https://doi.org/10.1111/1468-4446.12818

Brierley, L. (2021). Lessons from the influx of preprints during the early COVID-19 pandemic. *The Lancet Planetary Health*, 5(3), e115–117. https://doi.org/10.1016/S2542-5196(21)00011-5

Briggs, C. L. (2011). On virtual epidemics and the mediatization of public health. *Language & Communication*, 31(3), 217–228. https://doi.org/10.1016/j.langcom.2011.03.003

Briggs, C. L. (2020). Moving beyond "the media": Critical intersections between traditionalization and mediatization. *Journal of Folklore Research*, 57(2), 81–117. https://doi.org/10.2979/jfolkrese.57.2.03

Briggs, C. L., & Hallin, D. C. (2010). Health reporting as political reporting: Biocommunicability and the public sphere. *Journalism*, 11(2), 149–165. https://doi.org/10.1177/1464884909355732

Briggs, C. L., & Hallin, D. C. (2016). *Making health public: How news coverage is remaking media, medicine, and contemporary life*. Routledge. https://doi.org/10.4324/9781315658049

Callard, F., & Perego, E. (2021, January). How and why patients made long COVID. *Social Science & Medicine*, 268, 113426. https://doi.org/10.1016/j.socscimed.2020.113426

Champion, V. L., & Skinner, C. S. (2008). The health belief model. In K. Glanz, B. K. Rimer & K. Viswanath (Eds.), *Health behavior and health education. theory, research, and practice* (4th ed., pp. 45–65). Jossey-Bass.

Chevallier, C., Hacquin, A., & Mercier, H. (2021). COVID-19 vaccine hesitancy: Shortening the last mile. *Trends in Cognitive Science*, 25(5), 331–333. https://doi.org/10.1016/j.tics.2021.02.002

Chia, S. C., Lu, F., & Sun, Y. (2021). Tracking the influence of misinformation on elderly people's perceptions and intention to accept COVID-19 vaccines. *Health Communication*, online first. https://doi.org/10.1080/10410236.2021.1980251

Cook, P. S., Curryer, C., Banks, S., Neves, B. B., Omori, M., Mallon, A. H., & Lam, J. (2021). Ageism and risk during the coronavirus pandemic. In D. Lupton & K. Willis (Eds.), *The COVID-19 crisis: Social perspectives* (pp. 207–218). Routledge.

Couldry, N., & Hepp, A. (2013). Conceptualizing mediatization: Contexts, traditions, arguments. *Communication Theory*, 23(3), 191–202. https://doi.org/10.1111/comt.12019

Daase, C., & Kessler, O. (2007). Knowns and unknowns in the "War on Terror": Uncertainty and the political construction of danger. *Security Dialogue*, 38(4), 411–434. https://doi.org/10.1177/0967010607084994

Dingwall, R., Hoffman, L. M., & Staniland, K. (2013). Introduction: Why a sociology of pandemics? *Sociology of Health & Illness*, 35(2), 167–173. https://doi.org/10.1111/1467-9566.12019

Dutton, W. H. (2009). The Fifth Estate emerging through the network of networks. *Prometheus*, 27(1), 1–15. https://doi.org/10.1080/08109020802657453

Ecks, S. (2020, April6). *Coronashock capitalism: The unintended consequences of radical biopolitics.* Medical Anthropology Quarterly Rapid Response Blog Series. https://medanthroquarterly.org/rapid-response/2020/04/coronashock-capitalism-the-unintended-consequences-of-radical-biopolitics/

Engesser, S., Ernst, N., Esser, F., & Büchel, F. (2017). Populism and social media: How politicians spread a fragmented ideology. *Information, Communication & Society*, 20(8), 1109–1126. https://doi.org/10.1080/1369118X.2016.1207697

European Commission. (n.d.). *EU vaccines strategy.* https://ec.europa.eu/info/live-work-travel-eu/coronavirus-response/public-health/eu-vaccines-strategy_en

Eyal, G. (2019). *The crisis of expertise.* Wiley.

Feder, E. K. (2014). Power/knowledge. In D. Taylor (Ed.), *Michel Foucault: Key concepts* (pp. 55–68). Routledge.

Gross, M. (2019). The paradox of the unexpected: Normal surprises and living with nonknowledge. *Environment: Science and Policy for Sustainable Development*, 61(3), 20–25. https://doi.org/10.1080/00139157.2019.1589308

Gross, M. (2021). The largest possible experiment: The corona pandemic as nonknowledge transfer. *The European Sociologist*, 46(2). https://europeansociology.org/european-sociologist/issue/46/discussion/fe72fec8-ea0b-4089-a610-1eae552ed78c

Gross, M., & McGoey, L. (2015). Introduction. In M. Gross & L. McGoey (Eds.), *Routledge international handbook of ignorance studies* (pp. 1–14). Routledge.

Hall, K. (2021). Biocommunicability. The biopolitics of pandemic communication. In D. M. Berube (Ed.), *Pandemic communication and resilience* (pp. 3–18). Springer. https://doi.org/10.1007/978-3-030-77344-1_1

Hall, K., & Wolf, M. (2021). Whose crisis? Pandemic flu, "communication disasters" and the struggle for hegemony. *Health*, 25(3), 322–338. https://doi.org/10.1177/1363459319886112

Hallin, D. C., Briggs, C. L., Mantini-Briggs, C., Spinelli, H., & Sy, A. (2020). Mediatizing pandemics: Coverage of the 2009 a (H1N1) flu in Argentina, the United States and Venezuela. *Comunicación y Sociedad*, e7207. https://doi.org/10.32870/cys.v2020.7207

Hausman, B. L., & Tech, V. (2017). Immunity, modernity, and the biopolitics of vaccination resistance. *Configurations*, 25(3), 279–300. https://doi.org/10.1353/con.2017.0020

Hepp, A. (2020). Introduction. In A. Hepp (Ed.), *Deep mediatization* (pp. 1–16). Routledge.

Hepp, A., Hjarvard, S., & Lundby, K. (2015). Mediatization: Theorizing the interplay between media, culture and society. *Media, Culture & Society*, 37(2), 314–324. https://doi.org/10.1177/0163443715573835

Hernandez, R. G., Hagen, L., Walker, K., O'Leary, H., & Lengacher, C. (2021). The COVID-19 vaccine social media *infodemic*: Healthcare providers' missed dose in addressing misinformation and vaccine hesitancy. *Human Vaccines & Immunotherapeutics*, 17(9), 2962–2964. https://doi.org/10.1080/21645515.2021.1912551

Horolets, A., Mica, A., Pawlak, M., & Kubicki, P. (2020). Ignorance as an outcome of categorizations: The "refugees" in the Polish academic discourse before and after the 2015 refugee crisis. *East European Politics and Societies: And Cultures*, 34(3), 730–751. https://doi.org/10.1177/0888325419891204

Kerwin, A. (1993). None too solid: Medical ignorance. *Knowledge: Creation, Diffusion, Utilization*, 15(2), 166–185. https://doi.org/10.1177/107554709301500204

Konkes, C., & Foxwell-Norton, K. (2021). Science communication and mediatised environmental conflict: A cautionary tale. *Public Understanding of Science*, 30(4), 470–483. https://doi.org/10.1177/0963662520985134

Krishna, A., & Thompson, T. L. (2021). Misinformation about health: A review of health communication and misinformation scholarship. *The American Behavioral Scientist*, 65(2), 316–332. https://doi.org/10.1177/0002764219878223

Kuklinski, J. H., Quirk, P. J., Jerit, J., Schwieder, D., & Rich, R. F. (2000). Misinformation and the currency of democratic citizenship. *The Journal of Politics*, 62(3), 790–816. https://doi.org/10.1111/0022-3816.00033

Latour, B. (2020, March 26). *Is this a dress rehearsal?* Critical Inquiry. https://critinq.wordpress.com/2020/03/26/is-this-a-dress-rehearsal/

Lockyer, B., Islam, S., Rahman, A., Dickerson, J., Pickett, K., Sheldon, T., Wright, J., McEachan, R., Sheard, L., & the Bradford Institute for Health Research COVID-19 Scientific Advisory Group. (2021). Understanding COVID-19 misinformation and vaccine hesitancy in context: Findings from a qualitative study involving citizens in Bradford, UK. *Health Expectations*, 24(4), 1158–1167. https://doi.org/10.1111/hex.13240

Lovari, A. (2020). Spreading (dis)trust: COVID-19 misinformation and government intervention in Italy. *Media and Communication*, 8(2), 458–461. https://doi.org/10.17645/mac.v8i2.3219

Lupton, D. (2022). *COVID societies: Theorising the coronavirus crisis.* Routledge.

Lupton, D., & Lewis, S. (2021). Learning about COVID-19: A qualitative interview study of Australians' use of information sources. *BMC Public Health*, 21, 662. https://doi.org/10.1186/s12889-021-10743-7

Marcon, A. R., & Caulfield, T. (2021). The hydroxychloroquine Twitter War: A case study examining polarization in science communication. *First Monday*, 26(10). https://doi.org/10.5210/fm.v26i10.11707

McGoey, L. (2012). The logic of strategic ignorance. *The British Journal of Sociology*, 63(3), 533–576. https://doi.org/10.1111/j.1468-4446.2012.01424.x

McGoey, L. (2019). *The unknowers: How strategic ignorance rules the world.* Zed Books.

McGuire, K. (2021). COVID-19, contagion, and vaccine optimism. *The Journal of Medical Humanities*, 42(1), 51–62. https://doi.org/10.1007/s10912-021-09677-3

Meyerowitz, E. A., Vannier, A. G. L., Friesen, M. G. N., Schoenfeld, S., Gelfand, J. A., Callahan, M. V., Kim, A. Y., Reeves, P. M., & Poznansky, M. C. (2020). Rethinking the role of hydroxychloroquine in the treatment of COVID-19. *The FASEB Journal*, 34(5), 6027–6037. https://doi.org/10.1096/fj.202000919

Moore, K. C. (2020). Readapting pandemic premediation and propaganda: Soderbergh's *Contagion* amid COVID-19. *Arts*, 9(4), 112. https://doi.org/10.3390/arts9040112

Nair, S., & Howlett, M. (2017). Policy myopia as a source of policy failure: Adaptation and policy learning under deep uncertainty. *Policy & Politics*, 45(1), 103–118. https://doi.org/10.1332/030557316X14788776017743

Nguyen, C. T. (2020). Echo chambers and epistemic bubbles. *Episteme*, 17(2), 141–161. https://doi.org/10.1017/epi.2018.32

Nölleke, D., Scheu, A. M., & Birkner, T. (2021). The other side of mediatization: Expanding the concept to defensive strategies. *Communication Theory*, 31(4), 737–757. https://doi.org/10.1093/ct/qtaa011

Nordström, J., Thunström, L., Van't Veld, K., Shogren, J. F., & Ehmke, M. (2023). Strategic ignorance of health risk: Its causes and policy consequences. *Behavioural Public Policy*, 7(1), 83–114. https://doi.org/10.1017/bpp.2019.52

Ortega, F., & Orsini, M. (2020). Governing COVID-19 without government in Brazil: Ignorance, neoliberal authoritarianism, and the collapse of public health leadership. *Global Public Health*, 15(9), 1257–1277. https://doi.org/10.1080/17441692.2020.1795223

Parviainen, J., Koski, A., & Torkkola, S. (2021). "Building a ship while sailing it." Epistemic humility and the temporality of non-knowledge in political decision-making on COVID-19. *Social Epistemology*, *35*(3), 232–244. https://doi.org/10.1080/02691728.2021.1882610

Parviainen, J., & Lahikainen, L. (2021). Negative expertise in conditions of manufactured ignorance: Epistemic strategies, virtues and skills. *Synthese*, *198*(4), 3873–3891. https://doi.org/10.1007/s11229-019-02315-5

Pavlik, J. V. (1999). New media and news: Implications for the future of journalism. *New Media & Society*, *1*(1), 54–59. https://doi.org/10.1177/1461444899001001009

Rescher, N. (2009). *Ignorance (on the wider implications of deficient knowledge)*. University of Pittsburgh Press.

Santos, B. R. G. (2021). Echo chambers, ignorance and domination. *Social Epistemology*, *35*(2), 109–119. https://doi.org/10.1080/02691728.2020.1839590

Shahsavari, S., Holur, P., Wang, T., Tangherlini, T. R., & Roychowdhury, V. (2020). Conspiracy in the time of corona: Automatic detection of emerging COVID-19 conspiracy theories in social media and the news. *Journal of Computational Social Science*, *3*(2), 279–317. https://doi.org/10.1007/s42001-020-00086-5

Solomon, M. (2021). Trust: The need for public understanding of how science works. *The Hastings Center Report*, *51*(S1), S36–39. https://doi.org/10.1002/hast.1227

Strömbäck, J. (2008). Four phases of mediatization: An analysis of the mediatization of politics. *The International Journal of Press/Politics*, *13*(3), 228–246. https://doi.org/10.1177/1940161208319097

Strömbäck, J., & Esser, F. (2014). Introduction. *Journalism Practice*, *8*(3), 245–257. https://doi.org/10.1080/17512786.2014.889441

Tang, W., Khalili, L., Giles, J., Gartshteyn, Y., Kapoor, T., Guo, C., Chen, T., Theodore, D., & Askanase, A. (2021). The rise and fall of hydroxychloroquine with the COVID-19 pandemic: Narrative review of selected data. *Rheumatology and Therapy*, *8*(2), 681–691. https://doi.org/10.1007/s40744-021-00315-x

Taylor, C. (2014). Biopower. In D. Taylor (Ed.), *Michel Foucault: Key concepts* (pp. 41–54). Routledge.

Väliverronen, E. (2021). Mediatisation of science and the rise of promotional culture. In M. Bucchi & B. Trench (Eds.), *Routledge handbook of public communication of science and technology* (3rd ed., pp. 129–146). Routledge.

Van Dijck, J., & Alinejad, D. (2020). Social media and trust in scientific expertise: Debating the COVID-19 pandemic in the Netherlands. *Social Media + Society*, *6*(4), 205630512098105. https://doi.org/10.1177/2056305120981057

Vitek, B., & Jackson, W. (Eds.). (2008). *The virtues of ignorance: Complexity, sustainability, and the limits of knowledge*. University Press of Kentucky.

Whooley, O., & Barker, K. K. (2021). Uncertain and under quarantine: Toward a sociology of medical ignorance. *Journal of Health and Social Behavior*, *62*(3), 271–285. https://doi.org/10.1177/00221465211009202

Wise, J. (2021). COVID-19: How AstraZeneca lost the vaccine PR war. *The BMJ*, *373*(8287), n921. https://doi.org/10.1136/bmj.n921