

## No change without some continuity: Evergreen health myths resurfacing during the COVID-19 pandemic and associated journalistic corrections

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### Abstract

Crises allow falsehoods to flourish in communication environments, prompting negative consequences. Corrections issued in response, such as journalistic fact-checks, have difficulty undoing the harm falsehoods cause. This has been attributed to the design and distribution of corrections, presented as diametral to how false / misleading claims are reported; however, this argument has never been tested in a single study. We addressed this research gap through a content analysis of journalistic coverage of health myths surrounding the COVID-19 pandemic in the context of journalistic corrections. We found that 86.1 % of the misinformation items addressed in this coverage echoed health myths described in the literature for other outbreaks, suggesting that misinformation is largely recycled and tweaked to apply to new outbreaks. We also found major differences regarding the actors that journalists presented as those in which falsehoods and corrections originated – with the former stemming mainly from the civil society domain and the latter from the science domain. Finally, we found differences in the key properties of misinformation and corrections in the journalistic coverage analyzed, agreeing with existing theorizing. This suggests that corrections have a competitive disadvantage compared with misinformation. To address this, corrections should employ more supporting visuals and decreased complexity.

### Keywords

misinformation, health myths, corrections, fact-checking, journalism

## 1 Introduction

Disruptive events, such as the current COVID-19 pandemic, bring about serious changes, including to the communication environment and to people's media diets and habits – even if these are not primary effects. One such important change concerns an elevated need for information and orientation (Dan & Brosius, 2021; Kleis Nielsen, Fletcher, Newman, Brennen, & Howard, 2020). Nowadays, given the force with which the Internet is shaping our daily lives, many seek to meet these needs online. There, as extant research has elucidated, they will encounter not only correct information but also misinformation (Kleis Nielsen et al., 2020).

“Misinformation” is an umbrella term used to denote false or misleading content presented as true (Dan, 2021). In everyday language, misinformation is often referred

to as “fake news”; however, this latter term has been largely abandoned in academic discourse because of its conceptual imprecision (Tandoc et al., 2018). In the academe, two forms of misinformation are described based on whether the actors in which falsehood originated had the intention to deceive – namely, disinformation and misinformation (Dan, 2021; Egelhofer & Lecheler, 2019). *Disinformation* refers to the situation where the communicator of a message knows that the message is false or misleading but presents it as true nonetheless (i.e., knowingly). In contrast, *misinformation* – in what constitutes an unfortunate doubling of the umbrella term, which also includes disinformation – refers to a falsehood that the communicator mistakenly holds to be true and distributes without intent to deceive. In the remainder of this manuscript, we use “misinformation” as an umbrella term



for all kinds of false or misleading content, regardless of the intent of the communicator.

Misinformation comes in many forms. Some false or misleading claims are completely new, whereas others tap into a rich reservoir of long-lasting falsehood. In this study, we are interested in myths, which belong to the latter category.<sup>1</sup> Myths are old ways of misrepresenting people, issues, and events in communication (Morgan, King, Smith, & Ivic, 2010). They are accepted as true by a considerable portion of the population and can pertain to health, as well as a wide variety of domains (e.g., migration; e.g., Peter & Koch, 2016). As reviewed below, one stand-alone feature of myths is that they can be recycled whenever new developments, such as a new disease outbreak, allow for this.

Although people tend to expect that they will be able to recognize misinformation as such, research has shown that this is difficult in practice for many (Brenes Peralta, Sánchez, & González, 2021). People seem particularly susceptible to false and misleading claims delivered neutrally rather than in a sensationalistic manner (Staender, Humprecht, Esser, Morosoli, & Van Aelst, 2021). This is troubling because it endangers the democratic ideal of an informed citizenship, meaning that citizens will have a hard time making sense of political decisions and arriving at conclusions that are in tune with their attitudes (Dan, 2021). Moreover, misinformation can deepen the gap between attitudes in society and hostility among different-minded groups (Dan & Dixon, 2021). In the absence of a common truth, the possibilities of reaching a political consensus decrease, and the risk of polarization increases.

As expected, in numerous fields – such as politics, civic education, and journalism – various actors have met the developments related to misinformation with a great deal of concern. In response, they

1 Health myths must be distinguished from the other prevalent meaning of the term “myths,” which indicates narratives of fundamental relevance to a society (e.g., the origin myth of Rome, said to have been founded by two brothers raised by a wolf).

have begun offering digital literacy trainings with the hope of increasing people’s ability to discern between true and false / misleading content. Yet, perhaps the most tangible response to the current “infodemic,” defined as the viral spread of misinformation surrounding the COVID-19 pandemic (WHO, 2020), has been the increased availability of fact-checks.<sup>2</sup> These (journalistic) products can be defined as accurate messages providing alternative, true explanations in an attempt to set the record straight over misconstrued aspects of a specific issue or event – such as the current COVID-19 pandemic.

While corrections represent an important way in which journalists can stand up against misinformation, they are not without limitations. One issue that has been raised only recently concerns the way corrections are made and distributed because this is believed to place them at a competitive disadvantage to misinformation (Dan, 2021). To our knowledge, the present study is the first to address this gap in knowledge. We approached this through a content analysis of journalistic coverage of misinformation surrounding the COVID-19 pandemic in the context of corrections designed to debunk it. Two major news outlets in Germany were investigated – one public, one private. While we realize that content analyzing misinformation

2 It should be noted that fact-checks represent a relatively new journalistic genre that is to be distinguished from factual or spelling corrections of journalists’ own work (e.g., rectification of mistakes in reporting published in the newspaper of the following day). Moreover, fact-checks can be either confirming or disconfirming, meaning that their verdict can be either that the claim at hand is correct or that it is false. Thus, the term “correction,” if at all, may be suitable only for describing disconfirming factchecks, as their goal – unlike that of confirming fact-checks – is to correct a false belief. Also, the term “corrections” – when referring to texts or videos designed to debunk misinformation – may be overconfident because not every fact-check will succeed in correcting a false belief. Finally, corrections can be issued by various actors, whereas fact-checks are generally journalists’ domain.

as recounted in journalistic fact-checks is different from studying it where it surfaces (e.g., on social media), we believe that this represents a parsimonious albeit imperfect way to start this important line of work.

This study contributes to the literature in at least three ways. First, we generate knowledge on the characteristics of misinformation and associated status quo corrections in Germany, a cultural context typically neglected in this line of work. To our knowledge, this study is the first committed to that goal.<sup>3</sup> As a result, this study allows us to assess the applicability / plausibility of existing theorizing proposed based on studies conducted elsewhere in a different cultural context (Dan, 2021). Indeed, misinformation and corrections have been discussed mainly in the US and most intensely after 2016, the year Donald J. Trump took office as the 45<sup>th</sup> President of the United States (Guo & Vargo, 2020). In Germany, by contrast, interest in this topic was sparked in the context of the migratory movement of 2015, but it peaked only recently with the emergence of the COVID-19 pandemic (see for instance, Boberg, Quandt, Schatto-Eckrodt, & Frischlich, 2020; Dan, 2021). Second, our work sets the stage for the design of stimuli in future experiments, and eventually, for the design of enhanced corrections. Indeed, such content analyses as that reported here serve as “especially important [...] groundwork for building intervention strategies” (Peter & Koch, 2019, p. 439). Should status quo corrections indeed lag behind misinformation, then determining precisely in what ways they do so seems like a necessary prerequisite for identifying how they could be optimized. The third contribution of this study stems from the recognition that the most efficient corrections are those delivered immediately and that opinions on emerging issues tend to be highly malleable (Walter & Tuckachinsky, 2020). Indeed, recent research has emphasized that general warnings on

the existence of misinformation online do not suffice, whereas specific corrections do work (e.g., Vraga & Bode, 2021). From this, it follows that a focus on determining what is truly new in terms of misinformation during a pandemic and what is most suitably characterized as old wine in a new skin should be able to improve actors’ ability to act quickly in fighting the infodemic, both now and in future outbreaks. This is because such an effort will allow fact-checkers to build an arsenal of ready-to-use techniques – at least for the correction of evergreen myths – that they can turn to whenever known myths resurface.

## 2 Literature review

This study draws on literature focusing on the role of news media and social media in health crises, studies diagnosing the spread of misinformation and its characteristics, and work investigating counter-strategies, most notably journalistic corrections. Such research endeavors have preoccupied scholars in various social sciences, especially in communication and psychology. Below, we briefly review the most important teachings from this body of work, focusing on health myths, actors in which misinformation and corrections originate, and the key properties of misinformation and corrections.

### 2.1 The role of (social) media in health crises

Health crises – such as those prompted by the ongoing COVID-19 pandemic – often fuel a discussion on the role of news and social media in them. Analysts typically attest to the emergence of a large amount of coverage and take issue with its quality. For instance, in the COVID-19 pandemic, Wasserman, Chuma, Bosch, Uzuegbunam, and Flynn (2021, p. 3) observed an “unprecedented media coverage globally,” stressing that the news media “play a key role in keeping the public informed.” Other scholars have agreed with this view, explaining that expectations that news media will provide timely and accurate information are higher during crises than

3 However, see Maurer, Reinemann, and Kruschinski (2021), for a study of journalistic quality during the pandemic in Germany.

they normally are, as are expectations that misinformation will be kept at bay (e.g., Wollnik, 2021).

Scholars' verdicts regarding the extent to which news media and social media live up to the expectations heaped on them are often mixed. On the one hand, scholars grant that the ability to reach wide audiences is highly necessary in crises. On the other, they take issue with various aspects of (social) media messages. For news media, criticism generally boils down to a too narrow focus on negativity and sensationalism, especially as this is often paired with an omission of self-efficacy information (i.e., information about how people can maintain their health; e.g., Wasserman et al., 2021). Some scholars also point out a decreasing quality of reporting believed to enable misinformation to slip through (Popiolek, Hapek, & Barańska, 2021). For social media, the main area of concern is the prevalence of misinformation, although its potential for the transmission of corrections to those false and misleading claims is also recognized (Scannell et al., 2021). To illustrate, recent studies have found that misinformation surrounding the COVID-19 pandemic was prevalent on Facebook, WhatsApp, and YouTube (Biancovilli, Makszin, & Jurberg, 2021; Li, Bailey, Huynh, & Chan, 2020).

The existence of misinformation in news – and especially its prevalence on social media – is worrisome because false and misleading claims appear alongside accurate information, making it difficult for audiences to discern between the two. Put differently, true information must compete against false / misleading claims in framing contests. Preliminary work has indicated that those who prevail in framing contests tend to be particularly skilled in message design and distribution (Dan, Ihlen, & Raknes, 2019). Indeed, evidence is growing that this factor may be at play during health crises as well. A case in point is a recent study that found that anti-vaxxers, who often share misinformation, were more engaged in discussions on Twitter than pro-vaccination supporters were, in addition to being more skilled in their

communications (Germani & Biller-Andorno, 2021).

As mentioned above, one important way in which journalists respond to the prevalence of misinformation is by issuing corrections. Indeed, one recent study found that between January and March 2020, at the beginning of the pandemic, the number of fact-checks in the English language alone increased by more than 900% (Brennen, Simon, Howard, & Nielsen, 2020). Considering the general debate about mistrust in professional journalism and especially in established news media (Denner & Peter, 2017), initial findings suggest that it is precisely these news media that have been considered reliable sources of information for citizens during the pandemic, which is an encouraging result (Dan & Brosius, 2021). This may indicate that fact-checks actually help established media in redeeming themselves in the eyes of (at least some of those) audiences who were critical of professional journalism in the past.

Despite the promising results, fact-checkers' job is complicated by the unfolding nature of health crises, where knowledge is gained incrementally. For instance, in the absence of scientific evidence, fact-checkers often resort to opinion statements that are different from facts (Walter & Salovich, 2021). In addition, fact-checkers' independence is sometimes questioned, as is whether they are free of bias (Feng, Tsang, & Lee, 2021; also Denner & Peter, 2017).

## 2.2 Health myths

Like health communication in general (Dan & Raupp, 2018), misinformation surrounding epidemics and pandemics has been found to be exceptionally consistent in motif. Against this background, Li (2020) suggested thinking of misinformation as a cascade in which falsehood ascends, descends, and every so often, re-emerges. She explained that new items of misinformation may be met with high levels of attention but that "years-old lies get repeated and recontextualized" whenever the topic at hand allows for it (p. 127). Of the plethora of myths surrounding dis-

ease outbreaks – which may pertain to health, politics, and other domains – the present study chose to focus on health myths. In line with the literature reviewed in the introduction to this manuscript, a health myth is a set of long-lasting false or misleading claims that misrepresent diseases and resurface in the context of new outbreaks.

The most widespread items of health-related misinformation evolve around just a few major myths, which are as follows: (1) the virus is man-made; (2) the virus is harmless; (3) the virus is a form of divine punishment for humanity (“wrath of God”); and (4) one can diagnose, treat, or prevent viral contagion by alternative means. The prevalence of these health myths has been demonstrated in a wide array of studies on the major international outbreaks of the 21<sup>st</sup> century (Nguyen & Catalan-Matamoros, 2020). In the following, we briefly explain the key tenets of each of these myths.

First, the idea that a ravaging virus is man-made has been around for a long time and applied to numerous viruses before re-emerging during the current pandemic. Most notably, this myth remains widespread regarding HIV. As recently explained by Jeppsson (2017), in the case of HIV misinformation, the virus allegedly originated in a US military lab; the available evidence suggests that this myth originated in the intelligence services in the German Democratic Republic (GDR) during the Cold War. Currently, about one-third of African Americans still believe this myth (Bogart, Ransome, Allen, Higgins-Biddle, & Ojikutu, 2019). Recently, a representative UK study found that “beliefs that the virus is man-made and used for population control” were among the factors driving COVID-19 vaccine hesitancy (Jennings et al., 2021, p. 1). One of the most common themes of misinformation addressed by journalists concerned the origin of the virus and the idea that it was man-made (Morinha & Magalhaes, 2020), a bioweapon that either was released intentionally or that unintentionally escaped from labs (Pulido, Villarejo-Carballido, Redondo-Sama, & Gómez, 2020). Against this

background, it is unsurprising that almost one-quarter of people surveyed in various countries around the world incorrectly believe that the coronavirus was made in a laboratory (Kleis Nielsen et al., 2020).

Second, the idea that a virus is harmless (and the implication that experts overstate the risk) is also a typical reaction to an outbreak. The existence of differences between expert and lay risk estimates has been well documented (Riley et al., 2019). Experts and laypeople may use different measures and thresholds, with the former considering *public* health and the latter concerned about their *individual* health. When lay risk estimates are lower, we may be dealing with a coping mechanism for a fear-inducing situation. Indeed, the literature abounds in accounts of AIDS denialism, Ebola denialism, and so on (e.g., Nattress, 2011). A re-emergence of this myth in public attitudes has already been reported in the current pandemic, for instance, in the US (Krieger, 2021). Here, the dispute surrounded the claim that COVID-19 was much like the seasonal flu or common cold.

Third, the idea that a disease was set on humanity as a form of divine punishment stems from religious teachings (“wrath of God”). It has been applied to numerous outbreaks, including outbreaks of plague, malaria, and cholera. In the case of HIV, soon after its emergence, this virus was “constructed as a punishment for a perceived decline of moral standards, as the wrath of God on those challenging prevailing norms” (Dan, 2018, p. 54). The “wrath of God” myth has also been invoked in the COVID-19 pandemic (Canals, 2020). In the case of HIV, it was argued that God’s wrath had been prompted by what was perceived as promiscuous or immoral sexual acts – back then, this referred especially to homosexuality (Dan, 2018). In the case of COVID-19, a different rationale was presented, specifically that “this virus is Nature’s response to the aggressions we have continuously heaped upon it,” leading to climate change (Canals, 2020, p. 235).

Finally, humanity has a long history of trying and propagating alternative means

for preventing, diagnosing, or treating medical conditions. For instance, during the Ebola epidemic, 75% of the Nigerians surveyed in one study were uncertain about whether contagion “can be prevented by drinking salt water or eating *Garcinia kola*” (Ogoina et al., 2016, p. 1). Similar misconceptions surround HIV (Dan, 2018). In the case of COVID-19, recurrent “treatments” included harmless practices like taking garlic or chiropractic treatment next to potentially lethal ones like drinking chlorine or disinfectant or injecting it into one’s bloodstream (Biancovilli et al., 2021; Pulido et al., 2020).

To summarize, the above review of literature on various diseases suggests that the most common items of health-related misinformation are long-lasting and repurposed for the scope of new outbreaks, justifying the use of the term “health myth” to describe them. The four most common health myths concerned the origin of the virus (man-made; divine punishment), risk assessments (harmless), and alternative means to prevent / diagnose contagion or to cure the disease. Against this background, the following hypothesis was proposed:

H1: The items of misinformation surrounding the COVID-19 pandemic picked up for journalistic correction will evolve around a few evergreen health myths.

### 2.3 Actors in which falsehood and corrections originate

A discussion surrounding misinformation and corrections would be incomplete without addressing the actors in which each originated. Regarding the former, the literature generally agrees that – next to malicious actors that are few in number but vocal, some employing social bots – the main drivers of misinformation are everyday anybody (DiFonzo, Robinson, Suls, & Rini, 2012). Regular people are thus taken in by a specific item of misinformation and decide to pass it on to people in their networks. For instance, people sharing misinformation about Barack Obama’s place of birth or Hillary Clinton’s alleged

involvement in a sex ring for pedophiles may have believed that they had identified the danger posed by the two politicians and perhaps felt obliged to pass on this “knowledge” to others (Dan, 2021, p. 282). A recent study confirmed that most misinformation items in the current pandemic originated with ordinary people (Brennen et al., 2020). However, those items generated far less social media engagement than the relatively few false and misleading claims brought into circulation by actors in the public realm (e.g., politicians, celebrities); these represented only 20% of the misinformation items but generated 69% of total engagement on social media (Brennen et al., 2020).

To the best of our knowledge, existing research has not assessed whether journalists mention the actors in which falsehood originated in their fact-checks of that misinformation. Knowledge on this matter would be relevant because it would allow news users to reconstruct how fact-checkers approach misinformation. Yet, what is currently known is solely that experts and public health officials predominated in the reporting on the current and past epidemics and pandemics (Mellado et al., 2021), arguably because of these actors’ perceived credibility (Kleis Nielsen et al., 2020). However, as the current pandemic progressed, journalists began citing sources beyond these domains to include citizen sources (Mellado et al., 2021).

Switching perspectives to corrections, we know that established sources are mostly the ones that issue corrections; such established sources include scientists, high-brow media outlets, and authorities (Dan, 2021). While no specific indication that this was the case in the current pandemic could be found, what we know so far suggests an incongruity between the sources of misinformation and those of corrections. Indeed, if corrections are to be successful, it seems that they should also involve regular people as sources (Vraga & Bode, 2021). This is because “the perceived credibility of a source does not automatically result from its technical competence, but is also associated with perceived hon-

esty, integrity and impartiality” (Dan, 2021, p. 288, author’s translation).

In a nutshell, existing research suggests that the sources of misinformation are primarily regular people, whereas corrections are more commonly issued by expert sources. Hence, we expected that fact-checkers would present these same actors as those in which falsehoods and their associated corrections originated in their reports. We posed that:

H2: Journalists will present misinformation as stemming primarily from average members of civil society, whereas they will present medicine / science as a primary source for corrections.

#### 2.4 Key properties of misinformation vs. corrections

As mentioned above, health-related misinformation is pervasive and has serious consequences at the individual and societal levels. From this, it follows that such misinformation cannot be left unchallenged, and journalistic corrections are a key way in which it can be debunked. Yet, despite best intentions, corrections are often unsuccessful in correcting false beliefs. They “may fail to reach those who were misled; reach but fail to convince them (misbelief persistence); or reach and convince audiences but prove unable to promote an update of the mental model” (Dan, 2021, p. 278, author’s translation). In light of these scenarios, scholars have wondered why corrections appear to be at a competitive disadvantage to misinformation. Several explanations have been advanced, including audiences’ low ability and motivation to judge claims’ veracity. Yet, since such factors cannot be meaningfully influenced by actors issuing corrections, scholars and practitioners should focus instead on improving the way these messages are designed and distributed (Dan, 2021). Indeed, it may be worthwhile for corrections to use the same psychological mechanisms to their advantage that are already being employed by the misinformation they hope to correct (Dan, 2021). According to this argument, correction entities should not allow themselves

to be dragged down to misinformers’ level; rather, scholars should engage in a level-headed assessment of key properties of misinformation vs. corrections, which should allow us to determine where corrections may miss opportunities that are both rewarding and ethically acceptable.

Currently, misinformation spreads deeper and faster than associated corrections do (Dan, 2021). Indeed, a first hurdle for corrections is to draw the attention of people holding health-myth beliefs. This is not an easy task, considering the high number of stimuli competing for attention in the modern media environment. Furthermore, corrections may be discomfiting if they cause people to realize they are mistaken. Thus, a particularly pressing question is whether changes in the message design of corrections can dampen the “systematic bias in selected messages” (Knobloch-Westerwick, 2015, p. 3) that people holding health-myth beliefs may exhibit. Indeed, defense is a major driver of selective exposure to messages: Since people holding false beliefs tend to think that they are already optimally informed, there is a good chance that they will avoid corrections (Dan, 2021).

A recent survey of the literature, mainly from the US, identified differences between the key properties of misinformation and corrections that were linked to relevant psychological mechanisms (Dan, 2021). These mechanisms were relevant in that they could explain the differences in the attention the two attract in memorability, perceived credibility, and speed of distribution. This review concluded that misinformation has the following attributes: appealing to negative emotions, exhibiting low complexity (i. e., easy comprehensibility, using a narrative format), using supporting visuals presented as “evidence” for the claims made, diffusing online, and appealing to popular values and norms. Corrections, by contrast, were found to be devoid of appeals to emotions, complex, and purely text-based; they were disseminated from official sources on high-profile channels; and they did not contain any appeals to values and norms (Dan, 2021).

**Table 1:** Key properties of misinformation and corrections

	Misinformation	Corrections	Rationale
Appeals to emotions	Yes	No	Misinformation items address topics that include controversy and claims to unveil facts that elites would rather keep secret. As such, they typically appeal to negative emotions. This explains their high news value, as people pay attention to negative events for evolutionary reasons: Those who constantly surveyed the environment for potential threats had better chances of survival. By contrast, journalists generally strive for neutrality, and fact-checkers may be particularly reticent to appeal to emotions.
Complexity	Low	High	Misinformation stands out by being simple. First, claims provide a simple explanation, for instance, by establishing causal links between things that happened in proximity to one another, but that were in fact unrelated. Second, misinformation abounds in captivating stories, or narratives. People exposed to narratives experience transportation, which is known to lower both their capacity to think critically about what is told and their ability to counterargue. In contrast, corrections tend to be overly complex, which may cause the average media user to tune out.
Supporting visuals	Yes	No	The human brain is hardwired to attend to and trust content that is supported by visual cues / evidence. By including fabricated or manipulated visual “evidence” of claims (i. e., visual “proof”), misinformation adds to its perceived credibility. In contrast, corrections are often text based.
Diffusion	Fast	Slow	Fast diffusion: On social media, people share messages that are negative or that touched them emotionally. Content shared widely becomes familiar and is more likely to be perceived as true. By contrast, the slow diffusion of corrections means that they are shared less frequently. A factor contributing to this is likely their primary focus on posting in high-brow channels.
Appeals to values and norms	Yes	No	Misinformation appeals to widely shared values and norms. By falling on fertile ground – and thus being compatible and resonating with what people already believe to be true – misinformation stands a good chance of being considered accurate. Contrarily, corrections are devoid of such appeals.

Source: Based on Dan (2021).

Details are provided in Table 1.<sup>4</sup> As clear as these differences may seem, the research that informed this review was largely conducted in the US (Walter & Tukachinsky, 2020), raising the question of whether this juxtaposition also holds true in Germany.

Whether misinformation in the COVID-19 pandemic is easily comprehensible and appeals to popular values and norms has not been addressed in the literature thus far. In terms of these two

characteristics, we assume that misinformation spread during this pandemic shares characteristics of misinformation identified in other contexts (Dan, 2021). At the same time, the existing evidence does suggest that COVID-19 misinformation appeals to emotions, uses supporting visuals, and spreads online (Brennen et al., 2020; Germani & Biller-Andorno, 2021; Li et al., 2020; Popiołek et al., 2021; Scannell et al., 2021). Regarding corrections, we expected the opposite to be true – again not based on specific research findings on corrections during the COVID-19 pandemic but rather on literature related to a plethora of topics (Dan, 2021). We propose the following hypothesis:<sup>5</sup>

4 Note that the table does not represent conceptual / definition-related characteristics of misinformation versus corrections; instead, it includes common characteristics of both as they are empirically found. Thus, misinformation does not necessarily have to be low in complexity, appeal to negative emotions, and so on – although empirical analysis may find that it often exhibits these properties.

5 As explained in the “Method” section, “diffusion” was only measured for misinforma-

H3: Corrections will be characterized by fewer appeals to emotions than the misinformation items picked up for correction, higher complexity, less supporting visuals, and fewer appeals to values and norms.

### 3 Method

We conducted a content analysis of misinformation published, in the context of associated corrections, by two German outlets in the first six months of the COVID-19 pandemic. The analysis was focused on identifying the health myths picked up for journalistic correction, the actors presented as those in which falsehood and corrections originated, and the key properties of misinformation vs. corrections. In the following, we describe our data, the codebook, and the coding procedure.

#### 3.1 Data

We conducted a content analysis of  $N_{\text{articles}} = 99$ , addressing  $N_{\text{misinformation items}} = 159$ . The misinformation analyzed was published in the context of associated corrections on *tagesschau.de* and *bild.de* from January to June 2020 for the purpose of correcting it later. These two outlets were selected as they are among the most influential sources of information in Germany (Newman et al., 2021) and because each stands for a different type of journalism. While the former is the news website of the public broadcaster ARD, the latter is a private outlet, representing the most popular tabloid in Germany. Maurer et al. (2021) found that the quality of reporting on COVID-19 in these two outlets differed considerably in terms of several key indicators. For instance, the reporting on *bild.de* was less focused on facts than that on *tagesschau.de*. In addition, news on *bild.de* was not characterized by ambivalence; rather, it conveyed the impression of a clear state of affairs during the pandemic. In contrast,

tion. Hence, we do not test for differences between misinformation and corrections concerning this property but simply analyze this property for misinformation; this is why diffusion is not explicitly named in H3.

*tagesschau.de* was more inclined than *bild.de* to present the measures to contain the pandemic as appropriate and was less likely to pass negative political judgment. Our rationale was that findings might differ by outlet type, such that analyzing these two outlets should allow a more comprehensive understanding of the topic at hand than possible by investigating solely public or private outlets. We asked:

RQ1: What differences, if any, existed between *bild.de* and *tagesschau.de* with regard to the health myths picked up for journalistic correction (RQ1.1), the actors presented as those in which falsehood and corrections originated (RQ1.2), and the key properties of misinformation vs. corrections (RQ1.3)?

The main criterion for including a news item in the analysis was that it had to contain a specific claim about the SARS-CoV-2 virus or the COVID-19 pandemic, which was presented in the remainder of the article as false or misleading. News items that mentioned the existence of misinformation in passing, without devoting space to the debunking of specific false or misleading claims, were not included. Similarly, news reports that dealt with computer viruses were ignored, as were search hits leading us to the comments section of news items or underneath / next to irrelevant reports (i.e., featured as related articles).

To identify relevant news reports, we used *Google Advanced Search*, limiting the search to the two domains of interest (*tagesschau.de*, *bild.de*), the type of content to “News,” and the timeframe to January–June 2020. We searched for news items containing at least one German term suggesting the existence of a false or misleading claim (i.e., conspiracy, fake news, misinformation, disinformation, hoax) and at least one word referring to the pandemic (i.e., virus, Corona, COVID-19, SARS-CoV-2). This search strategy revealed 127 search hits, of which 99 met the criteria listed above and were included in the analysis. The remaining 28 search hits were eliminated for the reasons listed

above or because they were duplicate listings. Put simply, we did not draw a sample from the two outlets; rather, we sought to provide a full assessment of all articles published by the selected outlets during the period of analysis.

This strategy allowed us to rely on independent fact-checkers for the assessment of claims' veracity rather than having to perform such checks ourselves – a task that would have been outside the purpose of this study. Because of the difficulty and the ethical concerns of penetrating private channels of communication (e.g., WhatsApp, Telegram), we focused on misinformation that was picked up by journalists for the purpose of correction. This enabled the recording of both misinformation and corrections that co-occur. An additional argument in favor of our approach is as follows: When a piece of misinformation enters the mainstream, the established media – such as those analyzed here – play an important role in the dissemination of corrections to misinformation (Walter, Brooks, Saucier, & Suresh, 2021).

### 3.2 Codebook

The unit of analysis was the individual false or misleading claim for the analysis of misinformation in the context of corrective coverage and the corresponding debunking effort for the analysis of journalistic corrections. The coding began with capturing identifying information, such as the medium, date, and IDs of the article and the misinformation item described. It continued with the assessment of the specific false / misleading claim presented and the associated corrections, the nature of the corrections, actors, and key properties. Dichotomous measures were used throughout, with 1 standing for “present” and 0 for “absent.” As reported below, a few string variables were also used.

To conduct research that will be relevant beyond the current pandemic and to increase the social relevance of the research, the efforts were focused on recurring *health myths* and their corrections. To this end, coders began by copying and pasting each claim mentioned in the fact-

check and each associated correction in string variables, allowing us to retrace individual coding decisions. To record the myth at hand, four dichotomous variables were used, each standing for a particular health myth – with “present” in the context of the fact-check coded as 1 and “absent” coded as 0. Specifically, the categories were drawn (deductively) from existing research (Biancovilli et al., 2021; Nguyen & Catalan-Matamoros, 2020) and refined inductively using a stratified portion of the material (20%). The following categories were used: man-made virus, non-existent / harmless virus, wrath of God, and alternative means. In addition, we included an open category, where health myths beyond these four could be noted. This open category was meant to enable us to capture all health myths in the news reports analyzed, especially in the eventuality that more / other health myths than those explicitly operationalized here surfaced in the data. Details of each category are provided in the supplementary material.

We recorded the actors in which falsehoods and corrections originated, as reported in the fact-checks analyzed. Here, we used five dichotomous variables (0 / 1) and one string variable to capture actors across the domains of politics, civil society, the public realm, medicine / science, and religion. In addition, an open category was included where actors beyond those captured by the above categories could be recorded. As falsehood and accurate information can be endorsed by multiple actors, these categories are not mutually exclusive. Details of operationalization are given in the supplementary material.

For each correction provided, we assessed whether it involved a factual elaboration, offering an explanation of why the claim was false or misleading. The opposite of this was a simple rebuttal, in which it was simply stated that a claim was not accurate without an explanation being offered (Dan, 2021).

We used existing conceptual work (Dan, 2021) to develop categories reflecting the five *key properties* of misinformation (as described in fact-checks) and corrections. The following four dichotomous

categories (1=yes, 0=no) were used for each item of misinformation and correction: appeals to emotions, complexity, supporting visuals, and appeals to values and norms. Two of these properties were assessed using two sub-indicators each. Specifically, complexity was measured based on whether simple explanations were used and a narrative format was employed. In addition, the coding of appeals to values and norms was limited to those identified after having inductively coded a stratified subsample of 20% of the material analyzed to include solely anti-establishment and religion.

A fifth category, diffusion, was recorded only for misinformation. Indeed, recording this for corrections identified in online news articles would not have been meaningful and would have produced misleading findings (i.e., 100% established news outlets). Details are provided in the supplementary material.

### 3.3 Coding

The material was coded by two student assistants (one undergraduate, one graduate) at a large German university. The author trained the coders in four sessions lasting 60 min each. The materials used for training were selected from media other than those included in the analysis. Coders attended to a news item at least twice before collecting the data on the misinformation items and corrections. Intercoder reliability was measured on 20% of the articles included in the analysis using Krippendorff's alpha. Each individual score of agreement between the two coders was above .70.<sup>6</sup>

6 The following coefficients were attained: for the formal variables = 1.00; for the specific health myth: man-made virus = 1.00, non-existent / harmless = .87, alternative means = .88, wrath of God = 1.00; for the actors from which misinformation originated: politics = .93, civil society = 1.00, public realm = .78, medicine / science = .79, and religion = 1.00; for each of the five key properties of misinformation items, the individual scores were 1.00; for the actors of corrections: politics = 1.00, civil society = 1.00, public realm = 1.00, medicine / science = .77, and religion = .85; for the four key properties assessed for corrections: ap-

## 4 Results

In the following, the findings of our analysis are reported. In keeping with the literature review presented above, this section addresses health myths, actors, and key properties. Also, we present few descriptive results on corrections, specifically with regard to the prevalence of factual elaborations vs. simple rebuttals.

### 4.1 Health myths

The analysis revealed a limited number of health myths mentioned in journalistic corrections of such health myths, confirming H1. The most prevalent health myth (42.2%) discussed in corrective coverage about the COVID-19 pandemic was that SARS-CoV-2 was a *man-made virus* (keyword: "plandemic"). A typical claim picked up for correction was that the virus was in fact a bioweapon.

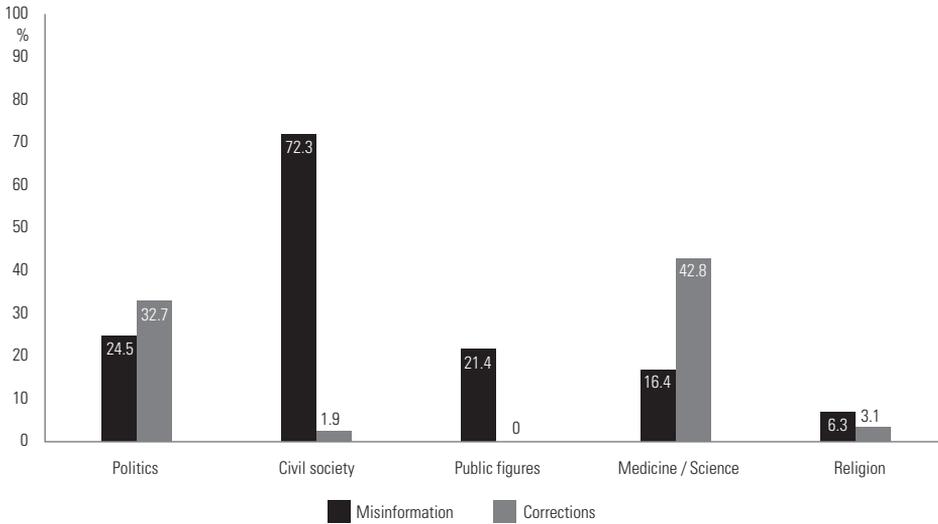
The second most common category of health myths on which corrective coverage focused concerned the *alternative methods* for preventing, diagnosing, or healing an infection with the virus (20.7%). For instance, some of the claims journalists addressed concerned the alleged benefits of eating garlic or drinking chlorine.

A third category of health myths addressed in corrective coverage was built by claims that authorities overstate the magnitude of risk, such that the virus was presented as *harmless* (20.1%). Such lay risk estimates often compare SARS-CoV-2 with the seasonal flu. Interestingly, few of the misinformation items journalists sought to correct concerned the opposite, such that it was claimed that authorities were playing down the risk of the virus (3.7%). However, the claim that the pandemic was a divine punishment for immoral behavior, generally described as the "wrath of God", was seldom addressed by journalists in their corrective coverage (3.1%).

In response to RQ1.1, some differences between the two outlets studied were encountered at the descriptive level. We

peals to emotions = .76, complexity = 1.00, supporting visuals = .81; appeals to values and norms = 1.00.

Figure 1: Actors in which falsehood and misinformation originated



report them with figures for *tagesschau.de* given first and those for *bild.de* second as follows: man-made virus: 26.4% versus 14.5%; alternative means: 8.8% versus 3.1%; harmless virus: 15.1% versus 5%; and wrath of God: 3.1% versus 0%. Yet, none of these differences were statistically significant, as revealed by  $\chi^2$  tests.

#### 4.2 Corrections

Most corrections to the misinformation items featured in the news articles analyzed were factual elaborations (54.7%). Thus, they explained precisely why a claim was false or misleading. By contrast, 45.3% were simple rebuttals, meaning that claims were merely classified as false or misleading, while the rationale behind this classification was not provided. At the descriptive level, most corrections analyzed here from *tagesschau.de* were factual elaborations (59.6%), whereas this was the case for only 45.5% of those published on *bild.de*. However, these differences between the two outlets analyzed were not statistically significant ( $\chi^2(1) = 2.912, p = .097$ ).

#### 4.3 Actors

The analysis confirmed H2, which posited that misinformation mentioned in journalistic coverage seeking to correct it will

stem primarily from average members of civil society, whereas journalists will primarily cite actors from the domain of medicine / science as those from which corrections originate. Specifically, over two-thirds of the misinformation analyzed here reportedly stemmed from actors in civil society (72.3%), whereas nearly half of the corrections provided originated in medicine / science (42.8%). In addition, as shown in Figure 1, nearly a quarter of the misinformation items mentioned in the news reports analyzed originated in politics (24.5%) and the public realm (21.4%). Furthermore, some misinformation items referenced in corrective coverage were attributed to actors in the science / medicine (16.4%) and religion (6.3%) domains. In addition to the mentioned field of science / medicine, nearly one-third of the journalistic corrections analyzed were attributed to the politics domain (32.7%). Actors from other domains – civil society, religion, and public realm – were seldom sources in corrections.

In response to RQ1.2, which focused on potential variations regarding the actors in which falsehood originated – as reported in coverage by the outlets analyzed – differences between the outlets were identified at the descriptive level.

These are reported as follows with values for *tagesschau.de* given first and those for *bild.de* offered second: politics: 20.1% versus 4.4%; civil society: 44.7% versus 27.7%; public realm: 12.6% versus 8.8%; medicine / science: 12.6% versus 3.8%; and religion: 6.3% versus 0%. However, only two of these differences were statistically significant. Specifically, *tagesschau.de* reported on more falsehood, described as identified in the politics ( $\chi^2(1) = 6.326$ ,  $p < .05$ , Cramér's  $V = .199$ ) and religion ( $\chi^2(1) = 5.643$ ,  $p < .05$ , Cramér's  $V = .188$ ) domains, compared with *bild.de*. In addition, at the descriptive level, we found some differences between the two outlets regarding the actors described as those in which corrections originated. These were as follows, with *tagesschau.de* listed first: politics: 20.1% versus 12.6%; civil society: 1.3% versus 0.6%; public realm: 65.4% versus 34.6%; medicine / science: 28.9% versus 13.8%; and religion: 12.6% versus 8.8%. However, none of these differences were statically significant.

#### 4.4 Key properties

We were also to confirm H3, which predicted that corrections would be characterized by fewer appeals to emotions than misinformation items featured in the context of the corrective coverage, as well as also by higher complexity, less supporting visuals, and fewer appeals to values and norms (Figure 2). Yet, differences in some of the key properties – that is, appeals to emotions, the use of narratives, and the use of supporting visual – were less evident than previous writings would have led us to expect.

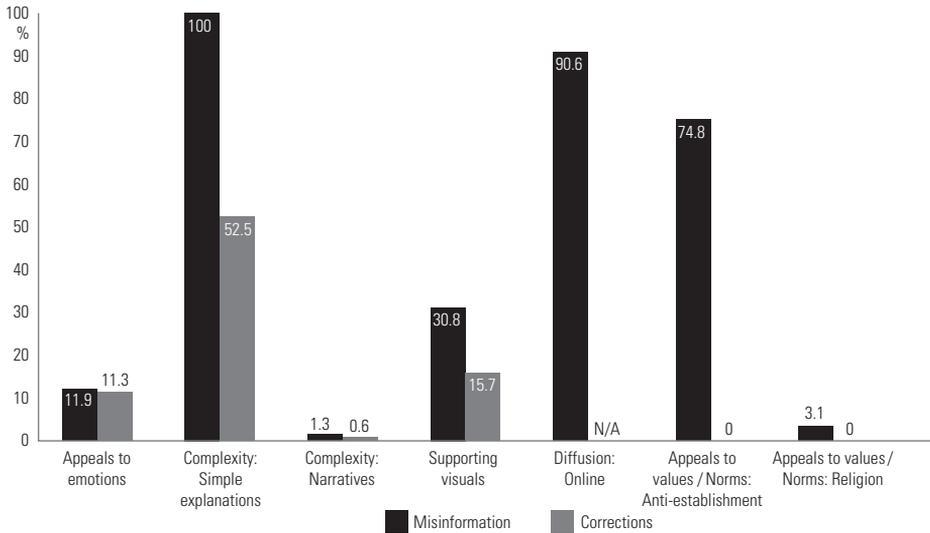
To be precise, in the news articles analyzed, it was reported that misinformation was delivered rather soberly, such that *appeals to emotions* were rare (11.9%). A similar proportion of the associated corrections appealed to emotions (11.3%). All items of misinformation featured in the news articles analyzed here provided a *simple explanation* for the emergence of the virus and / or the COVID-19 pandemic (100%). In contrast, only about half of the corrections provided were equally easy to comprehend (52.2%). Barely any misin-

formation items picked up for the purpose of correction (1.3%) or their related corrections (0.6%) resorted to a *narrative format*. The misinformation items described in the corrective coverage included *supporting visuals* in about a third of the cases (30.8%). By contrast, this was only the case for 15.7% of the corrections; thus, most were text-based. Regarding *appeals to values and norms*, the analysis revealed that the misinformation items described in the context of corrective coverage often included an appeal to anti-establishment values (74.8%). In addition, there were some appeals to religion (3.1%). Conversely, the corrections provided in this coverage were free of any appeals to values and norms. As mentioned, *diffusion* was only recorded for misinformation items addressed in the context of corrective coverage; nearly all the items were said to have been distributed online (90.6%).

To test for statistical differences between key properties of misinformation (as reported in the context of corrective coverage) and corrective information, we performed McNemar's  $\chi^2$  tests. This revealed that the corrections were significantly more complex ( $\chi^2(1) = 74.013$ ,  $p < .001$ ), used less supporting visuals ( $\chi^2(1) = 11.500$ ,  $p < .001$ ) and used fewer appeals to values and norms ( $\chi^2(1) = 124.000$ ,  $p < .001$ ) compared with the misinformation items they addressed.

In response to RQ1.3, we assessed potential differences between the two outlets in terms of the key properties of misinformation and corrections, respectively. At the descriptive level, some differences were evident in terms of misinformation, reported as follows with figures for *tagesschau.de* given first and those for *bild.de* second: appeals to emotions: 8.2% versus 3.8%; simple explanation: 65.4% versus 34.6%; narrative format: 1.3% versus 0%; supporting visuals: 18.9% versus 11.9%; and appeals to values and norms (52.8% versus 25.2%). In addition, we encountered variations in most of the key properties of corrections as follows, with percentages listed in the same order as in the previous sentence: appeals to emotions: 6.9% versus 4.4%; simple explanation:

Figure 2: Key properties



37.7% versus 14.5%; narrative format: 0.6% versus 0%; supporting visuals: 13.2% versus 2.5%. In terms of appeals to values and norms, the value was 0% in each case. Of the differences between the two outlets, only that concerning the use of supporting visuals in corrections was statistically significant, such that *tagesschau.de* resorted to them nearly five times more often than *bild.de* did ( $\chi^2(1) = 4.532, p < .05, \text{Cramér's } V = .169$ ).

### 5 Discussion and conclusion

This study started from the observations that crises allow falsehood to thrive in communication environments, prompting a wide array of negative consequences, and that it is difficult for corrections to rectify these negative consequences. This raised questions regarding status quo corrections: How are they made? Does juxtaposing their characteristics with those of misinformation suggest precise ways in which the appeal of corrections could be increased? We were the first to address this question, and in this study, we reported an investigation of misinformation items and associated corrections as they appeared in

the context of corrective coverage – with gains and drawbacks flowing from this decision, to which we turn below. Two additional goals were pursued here – namely, to unveil the most common health myths surrounding the COVID-19 pandemic that are addressed in the context of corrective coverage and whether they are truly new. We also sought to determine which actors were identified in corrective coverage as those in which falsehoods and their related corrections originated.

A first finding worth discussing was that in the context of the COVID-19 pandemic, the misinformation items picked up by journalists for the purpose of correction could be easily classified using categories known from health myths surrounding other epidemics and pandemics. To be precise, 86.1% of the misinformation items in this context referenced well-known health myths. This suggests that scholars were right in suggesting that history repeats itself and that novelty is not a distinctive feature of health misinformation (Dan & Raupp, 2018). Thus, while the pandemic has indubitably caused a great deal of change, and while it may have altered people's information behavior, the falsehoods they could find online largely

resembled those known from past crises – at least if corrective coverage is used as a proxy to identify the most potent false or misleading claims currently in circulation. Notwithstanding its limitations, this study is therefore the first to report evidence suggesting that health myths resurface when the opportunity arises – providing an impetus for scholars and fact-checkers to focus efforts on finding the best ways to correct a limited number of myths that are likely to re-emerge during the next epidemic or pandemic.

From the perspective of those seeking to correct misinformation, the finding that myths have a limited scope is encouraging. Misinformers do not seem to be highly versatile, which may be due to the tendency (or need) for their messages to resonate with the underlying culture. This suggests that fact-checkers can build an arsenal of ready-to-use techniques, which they can turn to whenever known myths re-emerge. This would mean a parsimonious use of resources, which would set time and effort free to deal with novel items. Furthermore, this suggests that the German context may not be so different from the others described in the literature. This is an encouraging finding, as it suggests that scholarship focused on these health myths can prove informative to journalists in countries beyond those in which they are studied.

A second finding obtained here was that the actors in which misinformation and corrections originated are largely different, at least as can be judged from a content analysis of corrective coverage. As anticipated, misinformation was attributed largely to regular people, whereas corrections were reported to come most from scientists. This finding was not surprising and is in line with past work (Vraga & Bode, 2021; DiFonzo et al., 2012). Yet, what makes this finding meaningful is the juxtaposition of the actors reported as those in which falsehood and corrections originated. This suggests the need to test whether increasing the number of ordinary people cited in corrections and / or that of actors from the public realm increases the perceived credibility of corrections and their

appeal. Such a scenario seems plausible and could be tested in future experimental research. Of course, we must first ensure whether fact-checkers deem corrections enhanced in this way acceptable.

The third finding of this research was that the key properties of misinformation items and corrections – as revealed by an analysis of corrective coverage – seemed to differ in their key properties in the ways we expected them to do. Yet, while we found evidence in support of existing theorizing (Dan, 2021) with regard to the properties assessed in both – that is, appeals to emotion, complexity, supporting visuals, and appeals to values and norms – some of these differences were less clear-cut than we would have expected them to be. Accordingly, only the differences concerning complexity, supporting visuals, and appeals to values and norms were statistically significant. We believe that this may be due to our decision to code misinformation second hand – as it was recounted in journalistic accounts for the purpose of correction. Indeed, fact-checkers are encouraged to reproduce false or misleading claims only as much as necessary for the purpose of correcting them; reducing repetition of these claims can help eliminate / tone down the appeals to emotions that they entail, the story webbed around them, and the manipulated / decontextualized visuals presented as evidence (Dan, 2021). Future studies could assess whether journalists truly subscribe to this best-practice advice, for instance, through interviews or by juxtaposing misinformation collected first hand with the associated corrections. We caution, however, that such an endeavor may prove cumbersome given the increasing tendency to identify and remove misinformation from social media platforms, such as Facebook, and the opacity of certain private groups to researchers. Regardless, if journalists had attempted to decrease the appeal of the misinformation items they sought to correct, this may have prevented us from uncovering some of the key properties of misinformation. In this eventuality, the differences between the key properties of misinformation items and corrections

may be even larger than our findings suggest. Put differently, if anything, we argue that our research design may have camouflaged and thus underestimated differences in the key properties of misinformation and corrections. Still, this study's findings suggest room for improvement regarding corrections' complexity, which should be reduced, and their use of visuals to support the line of reasoning presented, which should be increased.

In any case, the present study suggests that some differences exist in the key properties of misinformation and corrections. It is up for future experimental work to test whether adjustments in the areas where differences were most acute will increase corrections' appeal. As mentioned, for this to be a meaningful effort, we must weigh the ethical aspects connected to these changes with fact-checkers (Dan, 2021). It is likely that fact-checkers may fear that some of the changes would mean forfeiting some of their credibility. Thus, *perceived source credibility* seems to be a meaningful dependent variable to study in future experiments using status quo versus enhanced corrections as stimuli, next to the usual suspects, such as the ability to correct false beliefs.

As with any research, the present study is not without its limitations. Most importantly, the data presented here was merely a snapshot of misinformation in the context of a single pandemic, in one country and in just two outlets. This prevents us from generalizing our findings to other pandemics, countries, or outlets. However, we hope that our decision to focus on continuity and change in misinformation surrounding pandemics and thus on the prevalence of evergreen health myths will allow these findings to age well. Another issue of concern may be the number of articles analyzed here. However, as explained above, our analysis included all relevant news articles published in the outlets selected during the period of analysis. Thus, we are confident that at the very least, our findings allow us to make generalizable statements about the outlets analyzed here.

Critics could also point out that the knowledge generated here about misinformation was obtained based on journalists' re-narration. We grant that this is indeed a limitation, but we point out that this was communicated transparently throughout the manuscript and use the opportunity here to reiterate why this limitation was condoned. Specifically, designing the study in this way prevented us from attempting to infiltrate private communication channels where falsehood is known to flourish (e.g., on Telegram) and sift through all the claims encountered. This matters because the alternative avenue would have posed ethical challenges and would have threatened the feasibility of the study. Second, our approach allowed us to use independent fact-checkers' assessments of claim accuracy. Indeed, scholars lack training in verification techniques, which fact-checkers master. Third, the daunting task of searching for fact-checks for each misinformation item identified online and matching the former with the latter could be omitted here. Indeed, determining which misinformation item, such as a Telegram post, prompted which fact-check would be labor intensive and maybe even impossible, especially when done retrospectively as typical of content analyses.

### Conflict of interests

The author declares no conflict of interests.

### Supplementary Material

Supplementary material for this article is available online in the format provided by the author (unedited).

<https://www.hope.uzh.ch/scoms/article/view/j.scoms.2022.01.3067>

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