Research Article

What characterize the rumors circulating on social media in Israel in the first wave of COVID-19?

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ARTICLE INFO	ABSTRACT
	The outbreak of COVID-19 has transformed our daily lives, raising concerns about transmission, infection, and recovery rates. This has led to a proliferation of rumors. Online social media platforms have played a significant role in fueling the spread of these rumors. To better understand the character of rumors that circulated on social media during the initial months of the COVID-19 crisis, we collected and analyzed the content of around 100 major rumors, collected in Israel mainly from websites that track of the dissemination of rumors. We found that the majority of rumors focused on health-related issues. In addition: (1) The majority of rumors focused on ways to prevent contracting the virus or how to recover from it, with a significant emphasis on the body and health of individuals. There were significantly fewer rumors that addressed more "distant" issues, such as the origin of the virus. (2) Many rumors cited the name of a researcher or institution, either in Israel or abroad, arguably to enhance the credibility of the rumor. (3) While the number of rumors that aimed to downplay the severity of the pandemic (e.g., claims that government institutions intentionally exaggerated the threat, in order to control the population) was relatively small, it was double the number of rumors that inflated the significance of the pandemic (i.e., that it may be more severe and fatal than it appears). **Keywords:** social media, rumors, COVID-19

RUMORS: THEORETICAL BACKGROUND

A rumor is a piece of information whose origin is uncertain (Buckner, 1965; Rosnow & Fine, 1976). The distributor of a rumor is often unaware of whether the information is true or false. Every person exposed to the rumor may evaluate its level of credibility differently, based on their own experiences and biases (Jaeger et al., 1980; Van Der Linden, 2022).

Rumors can spread in various contexts, but they are particularly prevalent in crisis and disaster situations (Liu et al., 2014). Research has shown that people often spread rumors in attempts to create order, give meaning, or manage risks in uncertain or ambiguous situations, such as during disasters, wars, economic downturns, security threats, and health crises (Bordia & DiFonzo, 2007; Suarez-Lledo & Alvarez-Galvez, 2021). For instance, during a disaster, it may take a considerable amount of time before the causes and consequences of the event become known. This is a catalyst for the spread of rumors, as people seek

information that is not immediately available (Comfort et al., 2004; Zook et al., 2010) and may attempt to fill in the gaps with rumors (Stephens & Malone, 2009).

At the conclusion of World War II, Allport and Postman (1945) conducted a study in which they posited that rumors arise in situations of ambiguity. They argued that when the future is uncertain and the situation is important to citizens, rumors tend to spread. The researchers used the Pearl Harbor attack as an example, where the initial shock created uncertainty among the media and citizens. This shock and uncertainty provided fertile ground for the dissemination of rumors on a large scale, which became known as the "Pearl Harbor Rumors". Years later, Rosnow (1974) presented the sensemaking theory, which proposes that the primary purpose of passing on rumors is to cope with uncertainty and anxiety (Esposito & Rosnow, 1984; Rosnow, 1980). The more ambiguous and stressful a situation is, the greater the need to interpret it, to generate a clear understanding and find ways to alleviate the feeling of ambiguity. In his earlier work, Rosnow (1974) identified three waves of rumor transmission: the first stage involves the formation of the rumor in which a story is intentionally or unintentionally created; the second stage involves the spreading of the rumor and its dissemination among many people; and the third stage involves controlling the rumor, until the story eventually fades away.

Rumors in Social Media

During routine times, as well as times of emergency, individuals seek to obtain information from both official and unofficial sources (Bates & Callison, 2008; Sweetser & Metzgar, 2007). Acquaintance-based means of communication, such as WhatsApp and email, are often used to share information with friends and acquaintances (Palen & Liu, 2007; Stiegler et al., 2011). Non-acquaintance-based means of communication, such as Television and Websites are also popular sources for obtaining information, where the intended recipient is unknown (Boyle et al., 2004; Lev-On & Uziel, 2018).

Online social media have become increasingly popular as a source of information due to its high availability and accessibility (Doerr et al., 2012; Lev-On, 2012; Lev-On & Uziel, 2018; Palen & Liu, 2007). With the rise of social networks, people now rely heavily on them to obtain information. Unlike in the past, when rumors could take a long time to spread through word of mouth, the Internet and online social media have made it possible for rumors to spread quickly to a large number of people (Hagar, 2013; Simon et al., 2016).

The rapid transmission of messages on social media, contributes significantly to the spread of rumors (Silverman, 2015). This can be destructive in disaster situations, especially when false rumors are involved (Tierney et al., 2006). One such example is operation protective edge in Israel (Lev-On & Uziel, 2018), where both true and false rumors were disseminated. For instance, a family received a WhatsApp message claiming their son, who was a soldier, had died. The family later discovered that their son was alive, but the initial false news had taken an emotional toll on them (Averbach, 2016).

Social media platforms operate on the basis of social connections, which can help propagate rumors. When people receive information from their close and familiar social circles, they tend to believe it and share it. This phenomenon contributes to the creation of trust in rumors and their rapid spread through social networks (Garrett, 2011). Researchers have also demonstrated that during a crisis, people often seek information about their loved ones and may even turn to friends with whom they have limited contact, using social media platforms as a means of obtaining such information (Abbasi et al., 2010; Hagar, 2013).

Social media platforms have played a significant role in increasing the involvement of citizens in media and politics, enabling them to become content creators and distributors, and even "citizen journalists" (Hagar, 2013). The combination of official sources of information with content created by citizens and disseminated through social media contributes to the information overload that occurs during crises. This information overload, in turn, can increase uncertainty and make it more difficult to make decisions or filter reliable sources of information. As a result, when official information channels fail to provide answers to essential questions, unofficial channels often step in to fill the gap (Starbird et al., 2012).

Rumors in Health Contexts

Rumors regarding health can be especially troublesome as they tend to spread more quickly than established information (Vosoughi et al., 2018). Such rumors can result in people adopting damaging health-

related behaviors and can even impede the efforts of organizations responsible for managing public health (Jolley & Douglas, 2014; Lee & Oh, 2017; Pluviano et al., 2017; Suarez-Lledo & Alvarez-Galvez, 2021).

HIV/AIDS disease serves as a notable example of how rumors can spread within the context of public health. Its discovery in Western countries in the late 1970s led to extensive research and discussions, but a lack of reliable information and social anxiety fueled the dissemination of rumors. Various myths about AIDS circulated throughout American society, including the belief that only homosexuals could contract the disease (Fumento, 1990), that it could be transmitted through casual contact with objects like doorknobs, toilet seats, or swimming pools (Kimmel & Keefer, 1991), and even that the Central Intelligence Agency (CIA) had developed the disease as a means of targeting African-Americans and homosexuals (Turner, 1993), among others. As accurate information became more widely available, public anxiety about AIDS decreased, and the prevalence of rumors surrounding the disease declined (Osmond, 2003).

In 2002, SARS epidemic broke out in China, but the Chinese media remained silent about the disease until early 2003, when newspapers in one of its provinces started reporting on it (Zhang & Fleming, 2005). The lack of official information led to the rapid spread of rumors, causing panic among the public. One of the rumors that gained traction was that drinking rice vinegar could make individuals less susceptible to SARS virus, leading to people stockpiling rice and salt (Wong, 2003).

According to research, individuals who experience health anxiety are more likely to share rumors with others as a means of alleviating their mental distress (Anthony, 1973; Pezzo & Beckstead, 2006). It has been observed that rumors are often created and spread when individuals are in a state of health anxiety about a topic that is personally relevant to them (Bordia & Difonzo, 2004). In a recent study, researchers investigated the relationship between health anxiety and the frequency of rumor-sharing and found that individuals with high levels of health anxiety tend to share more rumors (Oh & Lee, 2019).

People with low health literacy are less likely to search for complex medical information (von Wagner et al., 2009), which may lead to reliance on intuitive cues for evaluating information (Oh & Lee, 2019). On the other hand, those with higher health literacy may be more susceptible to biases in decision-making (Swindell et al., 2010), but they are also more likely to thoroughly evaluate and verify online health information they come across (Diviani et al., 2015).

Significance of Source of Rumors

The processing likelihood model proposes that people can process information they receive through two distinct paths: central and peripheral. When processing information through the central path, people engage in deep processing of the message content (Petty & Cacioppo, 1986). In contrast, individuals processing information through the peripheral path focus on cues around them, such as the credibility of the message source, rather than the message itself (Pornpitakpan, 2004). Therefore, identifying a rumor with a reliable source, even if it is not actually reliable, can potentially accelerate its spread.

Source credibility refers to the extent to which an audience perceives an author/speaker's claims as valid, considering their expertise in the topic (Hovland et al., 1953; McCroskey, 1966). Research has demonstrated that source credibility plays a significant role in the persuasion process (Crano, 1970; Crisci & Kassinove, 1973; Gangloff, 1981; Manfredo & Bright, 1991).

Several studies have explored how individuals evaluate the trustworthiness of *medical* information found on various websites (Hu & Sundar, 2010; Sundar & Nass, 2001; Spence et al., 2013; Wang et al., 2008). However, limited research has been conducted on how people assess the reliability of medical information posted on social media platforms. Among the few studies that have explored this topic, Spence et al. (2013) investigated the issue of credibility in medical contexts on social networks within the African-American community. Similarly, Lin et al. (2016) examined source credibility assessment in social networks regarding medical issues and found that individuals tend to perceive information as more reliable if it has a certain level of authority.

"Dread" and "Wish" Rumors

The literature distinguishes between two types of rumors: "dread" rumors that convey frightening or undesirable events or outcomes, and "wish" rumors that express hope for positive or desired outcomes. According to Allport and Postman (1947), wish rumors sometimes arise in the context of difficult situations,

offering hope for a resolution. However, *fearful rumors tend to be more prevalent than favorable ones* (Rosnow et al., 1988). This is consistent with the findings of Kahneman and Tversky (1979) that negative events or information have a stronger impact than positive ones.

Rumors in the Context of COVID-19

In late 2019, the coronavirus (COVID-19) was first identified in China. The virus led to a severe respiratory illness outbreak and rapidly evolved into a global pandemic with unprecedented consequences in the modern era. The virus has dramatically altered our daily lives, prompting concerns about transmission, infection, and recovery rates. As a result, rumors have proliferated in an attempt to provide clarity in a time of confusion.

As health officials work to contain the spread of the virus and mitigate its harmful effects on the world's population, another threat has emerged: the epidemic has resulted in the proliferation of rumors related to the disease's outcomes, prevention, and recovery (Garfin et al., 2020; Ni et al., 2020). This misinformation has displaced healthy behaviors among the public and encouraged harmful practices that amplify the spread of the virus, ultimately resulting in poor physical and mental health outcomes (Tasnim et al., 2020). For instance, in Iran, hundreds of people died due to methanol poisoning after a rumor circulated that drinking alcohol could cure or prevent infection from COVID-19 (Aghababaeian et al., 2020). Similarly, in the United States, there were reports of people drinking bleach under the belief that it was a disinfectant capable of curing COVID-19 (Merchant & Lurie, 2020). A "miracle mineral solution," containing chlorine dioxide, sodium chloride, and acetic acid, was also promoted as a cure for COVID-19 (Chary et al., 2020). Another popular myth was that home remedies like taking vitamin C and eating garlic could cure or prevent the virus, despite a lack of evidence (Mian & Khan, 2020).

There have been rumors that have not necessarily disrupted citizen behavior but have instead damaged the public's trust in authorities. For instance, numerous theories have been circulating on the Internet about the origin of the virus, with some speculating that it was artificially created (Mian & Khan, 2020). Another common rumor is that the outbreak is linked to the activation of 5G mobile phone technology and the placement of new antennas (Bruns et al., 2020). The dissemination of false information had far-reaching consequences, such as discrediting reliable sources and causing public confusion, which could indirectly contribute to the further spread of the virus (Mian & Khan, 2020).

The centrality of social media can explain the significant impact on public health. In addition to the rapid spread of the virus itself, the quick dissemination of both accurate and misleading information about the outbreak and the disease fueled panic among the public. Dr. Tedros Adhanom Ghebreyesus, the Director-General of the World Health Organization (WHO), noted already in February 2020 that "misinformation about the coronavirus may be the most contagious thing" (Depoux et al., 2020), highlighting the crucial role of social media in shaping public perception and response to the pandemic.

Our research aimed to examine the primary content and characteristics of rumors surrounding COVID-19 in Israel. While previous studies on rumors have typically focused on their reasons for dissemination and their impact on readers (e.g., He et al., 2019; Kwon et al., 2013; Rosnow et al., 1988), *our research is unique in that it centers on the content and characteristics of the rumors*, particularly in the Israeli context. We selected Israel as our data collection location for several reasons. Firstly, the majority of Israelis (6.7 million) are active on social media and use the Internet regularly, which is considered a basic consumer product in the country. On average, Israelis spend approximately five hours daily browsing social media and surfing the internet (Bezeq Report, 2020). Additionally, Israel has experienced many emergencies (Navrátil & Navrátil, 2015), and the population is thus accustomed to the fact that social media may facilitate rumors (Simon et al., 2016).

Research Questions and Expectations

Following up on the review above, we ask:

1. What are the main themes appearing in rumors about the first wave of COVID-19? Based on studies about the coverage of past pandemics (for example, Fumento, 1990; Wong, 2003), we expect to find that the majority of rumors focus on the health of individuals, such as ways to prevent contracting the virus or how to recover from it.

2. How many rumors include source cues? Based on studies about source cues cited above (for example, Lin et al., 2016 and Spence et al., 2013), we expect to find that many rumors cite the name of a researcher or institution as a source.

3. How many rumors downplay vs. inflate the severity of the pandemic? We expect that fearful rumors will be more prevalent than favorable ones (see Rosnow et al., 1988).

METHOD

In order to answer the research questions, we used a qualitative content analysis of rumors related to COVID-19. Collecting rumors for analysis is challenging, as there is no official database, where all the rumors about COVID-19 can be found. Hence, we had to create a database for this purpose. In the initial phase of the research, we turned to a website called "irrelevant", which verifies rumors on various issues with officials. Using this website, we located a total of 68 rumors about the virus. Additionally, we conducted an interview with the website's founder and manager, Mr. Hanan Cohen, to understand how rumors are submitted and filtered for publication on the site.

During the interview, it was revealed that the Davidson Institute, which serves as the educational arm of the Weizmann Institute of Science, has been collecting various news related to COVID-19 on its website and verifying their authenticity. We have added a total of 32 rumors from their website to our database. After removing duplicate rumors, we were left with 80 rumors. We contacted the editor of the Davidson Institute's website and inquired about the source of the rumors in our database. He explained that they obtain these rumors from their Facebook group and media reports, and that their team of writers verifies the information before publishing it as rumors.

The rumors were published on the "irrelevant" website between February 2, 2020, and October 4, 2020, and on the Davidson Institute website between March 12, 2020, and July 5, 2020. *These rumors were collected during the first wave of the COVID-19 outbreak in Israel when there was high uncertainty. Consequently, the first wave created a fertile ground for the spread of rumors*, and in retrospect, it can be concluded that during this period, more rumors were created and collected. As time passed, the reliability of information improved, resulting in fewer rumors in subsequent waves. It is worth noting that if the study were conducted at a later stage of the epidemic, it would have likely focused on rumors concerning vaccines, which at that point became "the hottest topic" on the COVID-19 agenda.

In order to strengthen the validity of the study, in its second phase an online questionnaire was sent out to respondents, including the list of rumors that was compiled earlier. The questionnaire asked participants to indicate whether they had heard any of the rumors listed, and to add any additional rumors that were not included. The purpose of the questionnaire was to eliminate marginal rumors that none of the participants had heard and to identify significant rumors that were not initially included but to which people were exposed. A total of 45 anonymous respondents, distributed among different age groups, completed the questionnaire.

After reviewing the responses, it was decided to remove 11 rumors that none or only one respondent had heard. Additional rumors were presented that were not initially in the database. When the same rumor was mentioned by two or more respondents (2.5% of all the rumors presented), it was added to the list. As a result, nine rumors were added, bringing the total number of rumors to 78. The majority of the rumors were related to medical or health issues, with only 16 rumors dealing with other issues related to the virus. This highlights the significance of the health dimension of the crisis over its economic or political derivatives, at least in the early stages of the epidemic. Thus, we decided to focus on medical and health-related rumors and to remove those related to other issues. As a result, *the final list of rumors included 62 items*.

After reviewing all the rumors and creating initial prototypes, we conducted another brainstorming session and distilled the ideas into a few key themes. After further review of all the rumors, the researchers achieved a 95% consensus on the coding results.

FINDINGS

Following the analysis, we found a few themes in the rumors, which were collected. As expected, over a third of the rumors (23 rumors accounting for 37% of the total) referred to *the way the virus was spread*, as in

Figure 1. Corona on surfaces (from a marketing article on disinfection from COVID-19 on the website "Zissman insect control")

Figure 2. Seasoning for meatballs against the virus (from the Facebook page of "Tavliney Hashahar" https://m.facebook.com/shacharspices/)

this post from 25.3.2020, which provided some unverified information (at the time) about "how long does the virus survive on surfaces?" (**Figure 1**).

It is noteworthy that the individuals spreading rumors, like the one mentioned above, went through the effort of creating an image that suits their narrative and translating it into Hebrew. Other rumors have been circulating regarding the spread of the virus and *its decline*, such as claims that warm areas have a lower distribution and spread of the virus: "According to reports from WHO and other sources, the virus has been decreasing and disappearing in the region, where Israel is located" (April 15, 2020).

About one-third (19) of the rumors were related to ways of *preventing infection* (31%). For instance, there were claims like: "A weekly intake of 400 mg of hydroxychloroquine (PLAQUENIL) can prevent the development of COVID-19in the body" (23.3.2020). Some of these rumors were utterly ridiculous, such as the claim that "eating meatballs spice can help prevent COVID-19" (18.03.2020) (see also **Figure 2**).

The prevalence of rumors focusing on preventative measures for COVID-19 is higher than the number of rumors *claiming cures* for the virus (14 rumors, which accounts for 23%). This is likely because people tend to prioritize preventing infections beforehand rather than attempting to cure the disease once they have contracted it. Examples of such rumored cures include "the coronavirus can be cured by drinking freshly boiled garlic water" (16.03.2020) or "the coronavirus can be eliminated from the body by consuming a particular medication" (26.04.2020).

Also, nine rumors were dealing with the *origin of the virus* (15%), with the aim of understanding how the virus originated and where: "the Japanese professor of physiology or medicine, Professor Dr. Tasuko Honjo, caused a sensation in the media today by saying that the coronavirus is not natural" (27.04.2020).

Only a few rumors dealt with *vaccines* (3%), and *experiments* (3%), and they were characterized by a disconnection from reality: "It is important that you know that tomorrow, 1.5, a law is coming into effect that approves conducting experiments on humans and can bypass the human consent process if there is a medical emergency" (3.5 .2020).

Source Specification (Institution or Expert) in the Body of the Rumor

The second theme that comprised about one-third (22) of all rumors was related to the use of the name of an institution or expert (34%) in the medical field from Israel or abroad to confirm the reliability of the rumor. Among these rumors, 12 (55%) were attributed to an expert, while the remaining ten were associated with an institution (45%). Upon examining the breakdown by expert or institution in Israel or abroad, it was observed that most of the rumors (nine) were associated with experts from abroad (41%) for example: "Dr. Li-Meng Yan, virologist A senior Chinese woman claims: 'The virus was engineered in a laboratory and released to cause harm. I have proof that will come out soon'" (September 23, 2020).

Around a quarter of the rumors (six) cited institutions from abroad (27%), including hospitals, universities, and WHO, such as the following warning issued by WHO: "WHO cautions against the use of ibuprofen-type drugs when experiencing symptoms of COVID-19. Such medications may exacerbate the spread of the disease" (March 18, 2020).

In contrast to the widespread use of the names of foreign institutions or experts, the use of Israeli institutions or experts was significantly lower. About a quarter (five) of the rumors referenced Israeli institutions (23%), such as municipalities, health insurance funds, and hospitals, as in the following example:

> "Ichilov Hospital issued a sweeping statement today declaring that COVID-19 is not an epidemic, not an emergency, and not dangerous. Idit Matot, head of the corona department at Ichilov, stated that a ripple is not a wave and that she does not understand why masks are necessary, as we need to take care of other neglected patients" (June 28, 2020).

Only two rumors cited an expert from Israel (9%), such as in the following example:

> "I am a biochemist with a PhD from the Weizmann Institute and a professor at several academic institutions … A basic examination of the growth curve shows that the growth is not logarithmic, and the virus has been in the stationary phase for two weeks, meaning that it is declining and dying off" (April 15, 2020).

In a significant percentage of the rumors mentioning a source, the rumors included evidence to support the words of the expert or institution cited, with the aim of establishing their validity. Some rumors include *links to external sources* that purportedly verify and strengthen their claims. For instance:

> "For the skeptical public, it's not just the Indonesian study; there are already super serious studies, such as randomized double-blind trials, that have been conducted on vitamin D and respiratory infections, including an analysis by the British Medical Journal" (July 14, 2020).

Another example is a rumor spread in the name of WHO:

> "… with scientific explanation provided: WHO now officially recommends avoiding taking ibuprofen for COVID-19 symptoms" (March 18, 2020).

One point that arose in eight rumors featuring named sources was the inclusion of *numerical data* that was unrelated to reality and research. This data served to indicate the researcher's understanding and perspective on the subject of the rumor, giving their words a degree of credibility. Some of the rumors reported numbers of sick or dead, which turned out to be inaccurate. For example, Dr. Rotem Inbar stated,

"So far, 40,000 patients have been diagnosed in Israel–assuming we discovered a third, or less, there are perhaps 150,000 of which 380 are dead" (March 19, 2020).

Furthermore, there were rumors containing numerical data related to anti-COVID-19 drugs, such as

"Dr. Vladimir Zelenko treated 699 COVID-19 patients with hydroxychloroquine, zinc, sulfate, and z-pack. The result was: zero dead, zero ventilated, four hospitalized" (March 1, 2020).

In another example, it was claimed that

"Those who have a vitamin D deficiency have an increased risk of dying from COVID-19 by an astronomical ratio of 2500%" (July 14, 2020).

Among the rumors featuring named sources, a common theme was the self-importance attributed to the expert or institution. This topic was present in eight of the rumors and served to convince readers that the source was qualified and confident in their words. In most of these rumors, the self-importance of the sources was noticeable, such as the words of Japanese professor Tasuko Honjo:

"I have conducted 40 years of research on animals and viruses […] I have been working for four years in the Wuhan laboratory in China […] I can say with 100% confidence that COVID-19 is not natural" (April 27, 2020).

Another point that arose in seven rumors was the use of writing in lists, which is not usually characteristic of official announcements from institutions or even experts who typically formulate their opinions in an orderly and detailed manner, often through academic articles. However, some rumors were formulated as long lists, such as the words of Dr. James Robb:

"Here's what I do and the precautions I take now and will take in the future. These are the same precautions I use during flu seasons, except for the mask and gloves:

1. Avoid shaking hands. Instead, put your fists together and bow.

2. Use only your knuckles to touch switches.

3. Open doors with a clenched fist or hip.

4. Use disinfectant wipes in stores, if available.

5. Wash your hands with soap for 10-20 seconds and/or use hand sanitizer.

6. Keep a bottle of disinfectant at every entrance to your home and in your car.

7. If possible, cough or sneeze into a tissue and throw it away.

Here are some things I purchased in preparation for the outbreak of the epidemic in the United States:

1. Disposable latex gloves to use when going shopping.

2. Stock up on disposable surgical masks and use them to prevent touching your nose and mouth.

3. Purchase hand sanitizers and latex gloves now.

4. Buy zinc lozenges now. It has been proven that these lozenges are effective …" (March 10, 2020).

Distortion of the Extent of the Pandemic: Increasing or Decreasing It

The third and final theme pertains to the misrepresentation of the scope of the epidemic. This theme comprised 18 rumors, which accounted for about a third (29%) of all the rumors. It can be further subdivided

into two categories. Contrary to our expectations, two-thirds (12) of the rumors aimed to downplay the extent of the epidemic (67%) in order to reassure the public and normalize the situation. For instance:

> "… and the virus gives the impression that it has lost its potency, and by winter, the population will have developed antibodies that will protect everyone until then" (July 19, 2020).

On the other hand, one-third (six) of the rumors sought to exaggerate the scope of the epidemic (33%) in order to raise awareness and prevent people from becoming complacent. For example:

> "… the worst is yet to come: the incubation period has ended, and many more people will be diagnosed, statistically, many more people can now infect you" (March 27, 2020).

A significant proportion of discussions, which involved a reduction of the scope of the pandemic have featured recurring themes, including overly optimistic language that is evident in various rumors regarding the scope of the outbreak (totaling 12 rumors). This pattern aligns with the general content and tone of such rumors, which seek to downplay the scale of the epidemic and promote a "balanced" worldview. Some of these rumors attempted to convey optimism by including factual information, whether verified or not. For example:

> "A basic test of the growth curve shows that the growth is not logarithmic, and the virus has been at the end of the stationary phase for two weeks, that is, in decline and death" (March 15, 2020).

> "Research at the Erasmus Medical Center claims to have found an antibiotic against the coronavirus" (March 18, 2020).

Similarly, there were rumors that attempted to encourage the public and foster optimism by framing facts in a positive and friendly manner. For instance:

> "Here [in Israel] most of the patients are… healthy" (March 14, 2020).

> "A 103-year-old Chinese woman fell ill with corona and made a full recovery after being treated for six days against corona" (March 18, 2020).

In a third of the rumors that sought to downplay the severity of the epidemic, there was a clear disdain for public representatives, with criticism aimed at decision-makers and their policies. Some rumor writers claimed that the exaggeration of the situation was driven by the personal interests of decision-makers and institutional bodies, and they criticized such officials by minimizing the scale of the epidemic. For instance:

> "The Ministry of Health's gloomy and frightening predictions of your support for thousands and perhaps tens of thousands of dead have turned out to be completely wrong. It's time to admit the mistake, calm down, return Israel to normal activity and restore the economy, the economy, education, culture and more" (April 15, 2020).

> "Enough of the intimidation, enough of lying, the emergency laws and the dictatorship, we will not let them take away our freedom" (June 28, 2020).

Half of the rumors that dealt with increasing the severity of the epidemic contained prophecies of doom and gloom, in contrast to the rumors that sought to reduce the scope of the epidemic, which tended to be overly optimistic. This pattern is consistent with the nature of the rumors that predicted a worsening of the epidemic and saw it as a potential apocalyptic event. For example:

> "If your life is important to you, do not leave the house for anything and do not even go buy bread if you can freeze, because the worst of everything is about to begin: The incubation end date has arrived, many more infected people will be diagnosed, statistically much more people can now infect you [as in the original]!!!" (27.3.2020).

"The media hides the true information and lies and recommends shutting yourself up at home for two weeks" (February 2, 2020).

DISCUSSION

Rumors are a type of information whose origin is unclear (Buckner, 1965; Rosnow & Fine, 1976). When rumors are spread, the person sharing the information often does not know whether it is true or false. Rumors tend to be particularly common during times of disaster (Liu et al., 2014), when people feel a need to create order, give meaning, or manage risks in ambiguous situations (Bordia & DiFonzo, 2007).

In the age of social media, the speed and scale of rumor spreading has increased significantly (Hagar, 2013; Simon et al., 2016). Social media platforms have enabled people to become content creators and distributors, making them more involved in communication and politics (Hagar, 2013). Traditional media outlets do not always report on every issue, leaving a gap that unofficial information channels can fill (Starbird et al., 2012).

The widespread use of social media in recent years has led to the rapid dissemination of both official information and misinformation, similar to the rapid spread of the virus itself, which has caused panic among the public. In this context, health-related rumors are particularly problematic because they can lead people to take actions that put their own health and the health of others at risk (Jolley & Douglas, 2014; Lee & Oh, 2017; Pluviano et al., 2017).

For this study, we compiled a database of rumors that spread during the first wave of the virus outbreak in Israel. We built the database from relevant websites that gather information from Israel and abroad, namely the "irrelevant" and "Davidson Institute" websites, and it contained 78 rumors. We then cataloged the rumors by topic and filtered out those that did not relate to the medical or health aspects of the plague but instead dealt with economic or political fields, leaving us with 62 rumors for the study.

The first topic we analyzed was the understanding of the epidemic. The relatively large number of rumors related to health can be explained by comparing it to the AIDS epidemic, which, like the COVID-19 outbreak, was characterized by a lack of knowledge about the disease, leading to social anxiety and the spread of rumors related to medical aspects of the disease. Rumors related to political and economic issues were less widespread (Heller, 2015).

A recurring sub-theme is that many rumors focused on the transmission of the virus. This can be attributed to the ambiguous and uncertain character of the epidemic, as people sought to understand how to modify their daily habits to avoid infection. The sensemaking theory supports this idea, positing that rumors emerge as a response to anxiety and uncertainty, as individuals attempt to create a coherent understanding of the situation (Esposito & Rosnow, 1984; Rosnow, 1980). The similarity between rumors related to the spread of COVID-19 and those about the transmission of AIDS is notable, with both epidemics generating rumors about the ways in which the virus can be contracted, such as through contact with door handles, toilet seats, or swimming pools (Kimmel & Keefer, 1991).

Another sub-theme that emerged, albeit less frequently than the first, focused on preventative measures to avoid contracting the virus. This is consistent with previous epidemics such as SARS, where rumors circulated that drinking rice vinegar could reduce the risk of infection (Wong, 2003). This sub-theme is also connected to the third most common sub-theme, which dealt with potential cures for the virus. Since the majority of the population was not infected with the virus at the time, their primary concern was on how to prevent contracting the disease rather than how to recover from it.

The three sub-themes presented above are characterized by their relevance to the daily lives of the recipients of the rumors. This may explain why sub-themes such as the origin of the virus appeared less frequently compared to other rumors, as they do not have a direct impact on health and human life. Similar rumors appeared during the AIDS epidemic, such as the conspiracy theory that AIDS was developed by CIA to harm African Americans and homosexuals (Turner, 1993).

The second theme present in the rumors concerned the use of an institution or expert's name, accounting for about a third of all rumors. Indeed, several studies have shown that source credibility is an important factor in the persuasion process (Crano, 1970; Crisci & Kassinove, 1973; Gangloff, 1981; Manfredo & Bright,

1991). We propose that the processing plausibility model (Petty & Cacioppo, 1986) can explain this phenomenon. Due to the initial ambiguity and uncertainty surrounding the outbreak of the virus, people processed information through the peripheral route, focusing on cues such as the credibility of the source rather than the message content (Pornpitakpan, 2004). This may have led people to believe and spread the rumor. It is worth noting that this may also explain why rumor writers used this ingredient in the first place.

When we divided the rumors based on the source of the institution or expert (Israel or abroad), we found that twice as many rumors cited foreign sources. This could be attributed to the global nature of the epidemic, which affected the entire world, and Israelis' interest in understanding the epidemic and its consequences from countries facing similar situations.

The third theme focused on distortion in relation to the extent of the epidemic, either by reducing or exaggerating the reality of COVID-19. This is consistent with the findings in literature, where rumors can be categorized into two types: "horror" rumors that express fear and anxiety, and "wishful" rumors that express hope and positivity (Allport & Postman, 1947). We found that most rumors aimed to reduce the scope of the epidemic, possibly to reassure the public and normalize the situation, or to criticize the establishment for "inflating" the data and causing panic. However, a small number of rumors aimed to increase the extent of the epidemic, perhaps to raise awareness about the severity of the situation. These findings contradict the literature, which suggests that negative horror rumors are more common than positive rumors (Rosnow et al., 1988). This is particularly interesting in light of Kahneman and Tversky's (1979) theory that negative information is perceived as more important and therefore more likely to be shared than positive information.

There are two possible explanations for the contradiction we found regarding the prevalence of negative rumors in relation to the extent of the epidemic. The first explanation is related to the uniqueness of the COVID-19 pandemic, which is a global crisis that has not been experienced for about a century. This may have influenced the way people respond to the pandemic and the rumors that emerge around it, as opposed to other types of disasters that are more familiar and occur more frequently, such as wars and natural disasters.

The second explanation is related to the political situation in Israel. This situation may have allowed rumor writers to criticize the conduct of the establishment and to spread rumors that reduce the scope of the epidemic and question the severity of its impact. Some rumors even targeted public representatives in a derogatory manner. These rumors may have served as a way for people to express their frustration and dissatisfaction with the authorities, and to cope with the uncertainty and anxiety caused by the pandemic.

CONCLUSIONS

In this study, we analyzed the rumors that emerged during the first wave of the COVID-19 pandemic in Israel. The outbreak of COVID-19 created a global state of emergency, causing uncertainty and ambiguity about the virus's effects, which served as fertile ground for rumors. Our research focused on rumors related to the healthcare sector, which dealt with topics such as the transmission of the virus and potential treatments. This subject matter is particularly relevant and essential to human life, and previous literature suggests that people tend to engage more with rumors about topics that are important to them, especially during times of disaster and emergency. We also observed that the content of the COVID-19 rumors was similar to rumors spread about other diseases.

Another theme we identified in our study is the frequent use of the name of an institution or expert from Israel or abroad in the body of the rumor. While this topic was not specifically examined in the context of rumors, similar studies on the credibility of the source of health-related messages on social networks indicate that information containing the name of an authoritative body is perceived as more reliable. Using the processing plausibility model, we explained that due to the ambiguity surrounding the epidemic at the beginning of the outbreak, people relied on external cues, such as the credibility of the source, to process the information. This, in our opinion, is the reason why the information was perceived as true and therefore shared. The possible reason for the prevalence of rumors using the name of an institution or expert from abroad is the global nature of the epidemic.

A third theme focused on the distortion of the epidemic's scope. Contrary to existing literature that suggests negative information is more powerful and spreads more widely, our research found the opposite:

there were more rumors of a positive nature that reduced the scope of the epidemic than rumors that increased it.

Further studies are needed to examine the content of rumors related to COVID-19 that are spread through the media and social media. These studies should explore the characteristics of these rumors, as well as the variables that affect how people perceive their reliability and their willingness to spread them to others. Given the central role that rumors, and misinformation have played during the pandemic, such studies are crucial for understanding how to mitigate their negative impact and promote accurate information dissemination.

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