

Information Needs of Essential Workers During the COVID-19 Pandemic

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COVID-19 has been a sustained and global crisis with a strong continual impact on daily life. Staying accurately informed about COVID-19 has been key to personal and communal safety, especially for essential workers—individuals whose jobs have required them to go into work throughout the pandemic—as their employment has exposed them to higher risks of contracting the virus. Through 14 semi-structured interviews, we explore how essential workers across industries navigated the COVID-19 information landscape to get up-to-date information in the early months of the pandemic. We find that essential workers living through a sustained crisis have a broad set of information needs. We summarize these needs in a framework that centers 1) fulfilling job requirements, 2) assessing personal risk, and 3) keeping up with crisis news coverage. Our findings also show that the sustained nature of COVID-19 crisis coverage led essential workers to experience breaking points and develop coping strategies. Additionally, we show how workplace communications may act as a mediating force in this process: lack of adequate information in the workplace caused workers to struggle with navigating a contested information landscape, while consistent updates and information exchanges at work could ease the stress of information overload. Our findings extend the crisis informatics field by providing contextual knowledge about the information needs of essential workers during a sustained crisis.

CCS Concepts: • **Human-centered computing** → **Empirical studies in collaborative and social computing**.

Additional Key Words and Phrases: crisis informatics, essential workers, COVID-19, social media, information overload, information fatigue

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1 INTRODUCTION

The COVID-19 pandemic has been a sustained crisis like few before, and has presented unique challenges for people seeking vital information. On a daily basis, people have had to navigate a rich and complex information landscape to make decisions that impact their health, as well as the health of their communities and the world.

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Essential workers in fundamental industries have particularly needed accurate, timely, and relevant information about COVID-19 to keep themselves and their communities safe. While many U.S. employees worked remotely, 40% of the population held essential in-person job functions when the pandemic began [43]. Early work suggests that these essential workers are more at risk of exposure and death from COVID-19 [8, 18, 21], and often belong to underserved socioeconomic and racial populations [36, 43, 53]. Research into the experiences of healthcare workers during the COVID-19 outbreak has consistently found balancing personal safety with pursuing vital job functions increased stress levels [4, 47]. The speed of changing guidelines, uncertainty surrounding new information, and lack of a standard approach for information sharing at work compounded this stress and led workers to seek out news outlets and social media to fill perceived knowledge gaps [47, 56, 68, 75].

When essential workers turned to outside sources of information to learn about COVID-19, they contended with a unique and politically contested information landscape. Emergent work posits that where most crises are localized (e.g. natural disasters) and short-term (e.g. terrorist attacks), COVID-19 presents a unique situation to understand what happens to information ecosystems when a crisis is sustained and global [40]. Crisis events trigger specific information behaviors and increase information seeking as people seek up-to-date, locally relevant information [7, 19, 29, 58], but little is known about how those behaviors develop over time in a sustained crisis. Studies on COVID-19 information seeking behaviors thus far have found that keeping up with COVID-19 news can induce significant stress, and that reliance on social media for news consumption is tied to more extreme information overload, anxiety, and avoidance [2, 61]. Factors that contribute to these negative mental health outcomes associated with high media exposure may include the rapid politicization of the topic [28], high prevalence of misinformation online [78], and uncertainty around effects and spread of the virus [39]. However, we do not know how this complex COVID-19 information landscape was navigated by essential workers, or how their information seeking behaviors might be impacted by workplace communications or increased personal risk perceptions.

In this work, we qualitatively investigated the information work and practices of essential workers in the U.S. and their interactions with the COVID-19 information landscape. We sought to understand how essential workers encountered COVID-19 information in and out of the workplace, and how they made sense of and acted on COVID-19 information. During 14 semi-structured, in-depth interviews conducted from May to July 2020, we asked participants about their information work and practices around COVID-19. We then used thematic analysis inspired by grounded theory [13, 70] to identify salient themes. Our findings contextualize the information landscape in a sustained crisis, and explore how information needs at work influence external information seeking behaviors. We synthesize our findings into a framework of worker information needs, which centers the need to 1) fulfill job requirements, 2) assess personal risk, and 3) keep up with crisis news coverage. This framework can be used by future scholars and practitioners to guide work assessing crisis information adequacy in the workplace.

2 BACKGROUND

The arrival of the COVID-19 (SARS-CoV-2) virus in the U.S. was sudden and massive. Although the virus had already had an impact abroad, the first known case of community spread of COVID-19 on U.S. soil occurred on February 26th 2020 [16]. COVID-19 was declared a pandemic on March 11th 2020 by the World Health Organization [65]. Two months later, on May 28th 2020, the U.S. death toll surpassed 100,000 [65], higher than every other country in the world [6].

At the time of this research, COVID-19 has had an impact on nearly all aspects of normal life for over a year in the U.S. Due to the exponential rate of infection and unknown initial mortality rate or long-term health effects, many businesses, schools, and venues rapidly shut. As businesses

closed, unemployment reached 14.8% in April 2020, a rate not seen in the U.S. since the Great Depression [60]. Of the people who maintained employment, all who could were ordered to work from home, and estimates suggest 62% of American workers had done so by May 2020 [30]. Throughout this time, workers deemed “essential” continued to work despite great uncertainty.

This paper focuses on the impacts of the COVID-19 virus in the months after the virus spread in the U.S. We interviewed participants between May and July 2020, as they were adjusting to a crisis event while continuing to provide essential labor.

2.1 COVID-19 in the Context of Crisis Informatics

In times of crisis, people exhibit unique information needs and increased information seeking behavior which have been observed on traditional and social media [5, 46, 57, 58]. In past crises, traditional media have been used to access reliable information from trusted authorities, whereas social media has been used to seek information about how friends and family are being affected [7]. A rich body of work has explored how people use social media in times of crisis to get information quickly, provide resources for people impacted by a crisis, and to confer vital information to authorities at scale [14, 29, 67].

In the past, crisis informatics researchers have studied the information behaviors associated with crisis events ranging in time scale from shorter (e.g. terrorist attacks [29]) to longer-term (e.g. natural disasters like earthquakes [19]), hurricanes [33], or floods [25, 32]). *Dynes* first outlined eight socio-temporal stages of disaster, and *Rahmi et al.* identified that people’s information needs are most acute leading up to and at the peak of a crisis [20, 49]. These temporal stages are reflected on social media, where crises precipitate periods of increased activity and hazard-related information spreads quickly [44, 63], which can last longer in multi-day crises (e.g. [25, 32, 33]). However, the prolonged duration of COVID-19 has not yet allowed, at the time of this research, for a shift to the post-crisis phase. COVID-19 has surfaced questions about whether workers’ information behaviors experience a return to normal when they remain in a sustained state of crisis.

Work on previous pandemics offers a glimpse into expectations of information seeking behavior during COVID-19. News coverage of previous emerging infectious diseases has tended to lead people to rapidly and briefly seek information, a behavior that has been tied to increased anxiety [72, 74]. The 2009 H1N1 (“swine flu”) pandemic, for example, saw “rapid and short-lived” heightened anxiety tied to information seeking behavior [72]. Further relevant prior work explores the information needs of farmers during the 2001 UK foot-and-mouth disease outbreak [26]. Though this disease impacted animals, it resembled COVID-19: farmers isolated to prevent spread, the impact on a large community of rural farmers was severe, and the crisis lasted for several months. *Hagar* identified that farmers’ information needs changed through time, they sought information from traditional and non-traditional channels, and they had trouble extracting locally pertinent information from the national media narrative [26].

However, the information landscape surrounding COVID-19 has been unique in its intensity, longevity, and political character. COVID-19 has had a wide-reaching impact on information work and practices: news usage increased significantly in April and May 2020, with 78% of people in the U.S. getting COVID-19 related information online, followed by TV, social media, radio, and newspapers [45]. Newspapers launched sections devoted to COVID-19 coverage, data tools to track COVID-19 spread in specific areas, and adopted different financial models to keep the public informed of new COVID-19 developments. The combination of increased news consumption, uncertainty around spread and treatment of the virus, and prevalence of COVID-19 content across media platforms was quickly deemed an “infodemic” — a state of rapid and constant information propagation at a large scale, with rampant and hard-to-control misinformation narratives [2, 78].

COVID-19 coverage also rapidly became politicized and polarized [28], with a clear partisan split resulting in different adherence to COVID-19 guidelines [32].

The barrage of information covering COVID-19 contributed to information overload, heightened anxiety, and information fatigue among the public. Studies have established a link between the amount and uncertainty of information conveyed about COVID-19 via the media and negative mental health outcomes such as anxiety, depression, and loneliness [2, 34, 61, 66]. Researchers have also identified that increased media exposure and attention can be linked to higher risk perceptions (personal feelings of vulnerability to COVID-19) [23]. As the onslaught of information lasted over months, scholars feared that people may become desensitized to receiving information about COVID-19, and adherence to public guidelines may decline [35]. Since, there has been mounting evidence that people have started to suffer from information fatigue and may avoid new information about COVID-19 [15].

In all, though there have been other large-scale natural disasters and previous pandemics, COVID-19 is the first whose impact is felt so intensely and over such a sustained period of time in the U.S. Previous pandemics took place in a different information landscape than what we have today, and timely access to reliable COVID-19 information has been vital to contain the spread of disease. In this context, the information behaviors of essential workers were particularly salient, as they were a more vulnerable population and key to the continued functioning of society. This paper seeks to provide a rich and nuanced understanding of how essential worker's information behaviors adapted to a state of continual and omnipresent crisis in a contested media environment.

2.2 Essential Workers

The Cybersecurity & Infrastructure Agency, which defines national standards for essential workers, has labelled sixteen sectors as “essential critical infrastructure.” [1]. The agency labels essential workers as “workers who conduct a range of operations and services that may be essential to continued critical infrastructure operations.” Essential roles identified by the agency span retail, manufacturing, healthcare, transportation, construction, accommodation and food, and more. Estimates suggest that essential workers make up approximately 40% of the U.S. adult population [43].

A growing body of work, primarily centered on healthcare workers, evidences that essential workers were placed under significant strain during the COVID-19 pandemic. Multiple qualitative and quantitative studies have demonstrated that essential workers across countries were more likely to suffer from anxiety and depression [12, 41, 68]. Among the primary reasons for poor mental health among essential workers were fear for personal safety, increased workloads, and the emotional toll of their work [4, 22, 27, 31, 41, 47]. Mental distress among essential workers was particularly acute for Black and Hispanic workers [24]. While some studies have found that healthcare workers face no higher risk of contracting COVID-19 through their work [9], some studies suggest that frontline workers in other industries were more likely to contract COVID-19 than non-essential workers [21, 37]. These stressors also disproportionately impacted already vulnerable communities, as essential workers are on average less educated, have lower wages, and consist of proportionally more minorities and immigrants [11].

Studies about essential workplaces during COVID-19 have tended to focus on the overall implementation of safety protocols, which may include how protocols and COVID-19 updates are communicated to employees. During the COVID-19 crisis, employees across industries desired timely, transparent, and comprehensive communication from their companies about any impact to their role or expected duties [38, 76]. Although workplaces largely implemented some COVID-19 policies to protect employees and continue operating, current work suggests these were not implemented everywhere and were not always effective [50, 52, 76]. A survey of grocery store employees in the U.S. found that although only 58% of grocery store employers conducted COVID-19 employee

training and only 39.5% of employers sent employee positive case updates, these communication practices increased worker's sense of safety at work [17]. Early trends indicate that the quality and consistency of information shared by employers of essential workers may also have been tied to mental health outcomes [22].

However, we have limited information about the relationship between the guidance that essential workers received from their workplaces and their broader information behaviors. There is some theoretical grounding for the belief that heightened risk in the workplace changed information behavior: a 2008 study of workers in a manufacturing plant found that perceptions of risk and ability to stay safe at work impacted worker desire to seek safety information [54]. In the context of COVID-19, inconsistent workplace safety guidance or training has been reported in numerous studies and industries [17, 50], but few explore the downstream effects of how this may impact essential worker information behaviors generally. Early work has found that home health aides caring for vulnerable patients felt a need to supplement information about COVID-19 provided by their employer with independent research [68]. In our work, we explore how factors of workplace communications and essential worker risk perceptions impact information seeking and consumption behaviours in and out of the workplace.

3 METHODS

To gain a deeper understanding of the experiences of essential workers in the U.S., we conducted a series of semi-structured virtual interviews with 14 essential workers across fundamental industries. We analyzed the interviews using inductive thematic analysis inspired by grounded theory [13, 70]. These procedures were approved by the Institutional Review Board at Cornell University.

Participants were recruited using multiple methods. An initial round of participants was recruited via personal connections. During this early phase, we also reached out to grocery stores local to the authors of this study to offer this study opportunity to interested employees. The pandemic constraints made both types of recruiting slow and difficult. We used targeted advertising on Facebook to expand and speed up recruitment, which proved more successful. Rapid-response research such as this sometimes requires smaller sample sizes and uneven recruiting, which affected our methodology [3]. In all, four participants were recruited through word-of-mouth, one participant through direct outreach to stores, and nine through Facebook Ads. P1-P4 were interviewed in May 2020, P5-P6 in June 2020, and the rest in July 2020.

We used simple criteria to include participants in this study: whether the person is over 18 years of age, located in the U.S., and was required by their workplace to continue to go into their place of employment. To be eligible, participants self-identified as having "physically gone into work for the duration of the pandemic." Our participants all meet the official definition of an essential worker established by the Cybersecurity & Infrastructure Agency [1]. Further, they would all be considered frontline workers by Blau et al., whose work defines frontline workers as employees who completed over half of their work in person during the early stages of the pandemic [11]. Among our fourteen participants, three worked in emergency or first responder roles (P1, P2, P4), four were healthcare essential workers (P4, P7, P10, P14), and ten were non-healthcare essential workers. None of our participants served in managerial roles.

We took several ethical considerations into account. To protect participants' health, interviews were conducted remotely via Zoom. Participants could choose whether they wished to be interviewed via video or audio only, and were compensated \$15 for a 45 minute interview. At the start of each interview, we obtained verbal consent to record, made it clear to participants they could stop the interview or skip any question at any time, and guaranteed anonymity.

Table 1 summarizes the demographic characteristics of each of our participants. Participants entered gender into a free-form text box, which we consolidated. To protect participants' privacy,

Table 1. Study Participants

Participant ID	Occupation	Gender	Age	Population of City/Town	State
P1	Law enforcement	M	25-34	100-250k	Indiana
P2	Emergency responder	M	25-34	100-250k	Utah
P3	Transportation engineer	M	25-34	100-250k	Georgia
P4	Emergency responder	M	35-44	<5k	Colorado
P5	Grocery store employee	F	55-64	5-50k	New York
P6	Grocery store employee	F	35-44	250k-500k	Florida
P7	Healthcare worker	F	45-54	250k-500k	Florida
P8	Grocery store employee	F	45-54	250k-500k	Florida
P9	Flight attendant	F	25-34	>1M	California
P10	Healthcare worker	M	25-34	250k-500k	Pennsylvania
P11	Grocery store employee	F	25-34	>1M	New York
P12	Non-profit worker	F	55-64	250k-500k	Georgia
P13	Factory worker	F	25-34	>1M	California
P14	Healthcare worker	M	25-34	<5k	Texas

we do not disclose their exact location and have abstracted their job title. To limit the number of drop-offs from Facebook Ads, we chose not to ask about more sensitive topics that included race, income, and political leaning and we do not report these. A follow-up email was sent to gather political alignment, but only five participants responded and further efforts to gather demographic information were halted.

We used semi-structured interviews to dive deeper into each participant's engagement with COVID-19 coverage, including a contextual inquiry. Interviews were conducted by the first author, lasted 33 minutes to an hour, and averaged 44 minutes in length. We designed the interview protocol to systematically evaluate the ways that each participant keeps up-to-date with COVID-19 information. During the interviews, the participants were prompted to assess and talk through the information sources through which they heard COVID-19 news. In particular, we asked each candidate about how they engage with COVID-19 information through their workplace, traditional media, social media, and social circles.

We used an inductive thematic analysis approach inspired by grounded theory [13, 70] to analyze the interviews. Two of the authors began by separately open coding P1 and P2 interviews, then met to align on emerging themes. The first author then created an affinity map of all of the open codes, merging codes together into larger themes. This hierarchical code book was discussed and iterated upon by all authors. The first author then proceeded to use the code book to code P13 and P14, adding any new themes, before applying the code book to all remaining interviews. For the analysis of the coded transcripts, we began with making sense of the code frequencies and creating code matrices to compare co-occurrences of codes in the same interviews. The codes and analysis were then discussed by all authors and consolidated into meaningful themes.

4 FINDINGS

Our analysis yielded three central information needs of essential workers in the early months of the pandemic. Worker information needs included 1) the need to receive information to fulfill job requirements, 2) the need to receive information to assess personal risk, and 3) the need to stay informed of current events without sacrificing mental health. These information needs were

impacted by the sustained and global aspects of the crisis, and will be present for future crises of this magnitude.

4.1 Workers needed information to fulfill their job requirements

Most directly related to their employment, participants needed to be kept informed of how the ongoing crisis impacted their day-to-day job requirements. Most participants primarily only needed to know about protocol changes (e.g. mask wearing, distancing guidelines), but some received additional COVID-19 updates (e.g. daily local case count tallies) or information to convey to others (e.g. reasoning behind protocols to enforce).

Participants reported drastic variations in how their employers communicated COVID-19 information. Official communication channels included in-person indications (e.g. posters, safety officers, or meetings) and remote communication (emails and sometimes text). Custom tools were also adapted, as P13 and P9 mentioned that the machine they logged into before starting their work duties was amended to include COVID-19 safety protocols. Some employers also used more informal communication to supplement official channels, such as creating social media groups for employee discussions. The workplace methods of communications were grounded in existing channels used to convey information to employees before the pandemic.

4.1.1 Communicating protocol changes. All participants reported receiving information from their employers about job protocol changes. Protocol changes usually outline an action that the worker must take; the most commonly reported protocol changes in our study included mask wearing, social distancing, and cleaning guidelines.

In all, nine of the 14 participants stated that they were generally content with the way their workplace communicated new COVID-19 protocols. In particular, participants felt that consistent and frequent communication helped them feel up-to-date: P5 stated that *“the emails that go out are timely and contain the information I need to know”* and P4 similarly expressed *“They were doing a pretty good job of emailing us on like a four or five day base rate.”*

Participants reported that consistent guidelines made adhering to protocols easier, while implementing rapidly changing instructions could be challenging. For example, P10 said that protocol changes are *“not very frequent, so that’s a good part about it”* while P6 says she did not feel the need for additional workplace guidance because *“it really hasn’t changed – we all know that we’re supposed to stay six feet apart and social distance, so there’s nothing new that [the company] can tell us.”* In contrast, other participants felt that when protocols were changing rapidly, they could be hard to keep up with. For example, P9 explained that she adjusted her behaviour:

Most people weren’t actually paying attention [to new protocols], you’d just look for keywords. But now you have to, because the policies are changing every day. - P9

To help make sense of rapidly changing information, participants thus appreciated when employers provided ways to create dialogue about new policies:

[My employers] also gave us a platform to ask questions to get clarifications, or to ask what you really need to know better or further our understanding. - P11

P14 reported that his employers provided key COVID-19 protocol changes through a WhatsApp group. P14 felt that this strategy was effective as *“it’s easy, it’s fast, it’s timely, you can’t miss a thing,”* and highlighted that such a group allowed for disagreement: *“if somebody is not okay with such information, you can raise it [in the WhatsApp group] or you can suggest something else that you want.”*

4.1.2 Additional COVID-19 information as a requirement for work. Beyond protocol changes, five of our participants had professions that required them to receive specific, frequent COVID-19 news

and updates at their workplace. For example, P1 was a law enforcement officer, and had to know which laws to enforce, while the emergency responders P2 and P4 would use different coordinated response strategies based on daily local case counts, and the flight attendant P9 had to be informed of new COVID-19 regulations impacting every destination. These professions required employees to receive additional, frequent updates about the local spread of the virus or changes to local laws. These workers reported feeling up-to-date with what was happening in their local area, as they had a consistent source of detailed information about COVID-19 from a source of authority that they trusted and relied on. For example, P1 stated:

We get updates every time I go to work anyways, so I have a general sense of where it's headed, at least in Indiana. - P1

Similarly, when asked about whether she actively stayed up-to-date with COVID-19 news, P9 explained that *"just because of the nature of my work [as a flight attendant], I kind of don't have a choice because you get a lot of that stuff just coming in"*. These types of workers thus received an additional, mandatory stream of COVID-19 information than those who were only informed of protocol changes.

4.1.3 Conveying COVID-19 information to others. Beyond understanding information for themselves, seven participants also had to convey COVID-19 related information to third parties as part of their job duties. P12, who worked at a non-profit that offers aid to unhoused people, was a unique example of this information need. She described creating flyers in Spanish about how to protect against COVID-19 to reach local Latino immigrant populations, and going to funeral homes to take pictures of people who had died in the unhoused community to show the direct impact of the virus to others. P12 described that she struggled to convey the seriousness of COVID-19 to the community of people she served, and that she felt personal responsibility to make up for the fact that news often did not reach them.

You have to [provide information] in a way that show your compassion, because everybody's not gonna make it to all of these websites. - P12

Though most participants did not have to actively research the information they passed on to others like P12 did, those who had public-facing role still needed to convey information to others, for instance customers and patients. Some of our participants explained that conveying store protocol information to the public could be challenging. For example, P5 recalled that one customer asked her why she was wearing a mask, and laughed at her answer. In this instance, P5 had to justify store protocol using information she had researched herself, highlighting that public-facing employees had to provide external justification for corporate decisions. P5 also highlights that she "just walked away," indicating that she was not sure how to enforce the rule and had not been given enforcement information from her company. This story showcases a common theme, which is that participants often lacked information and guidance on how to safely enforce protocols. For example, P9 grappled with how her role changed as a result of these new protocols: *"There are so many policy changes, and not having clear guidelines as to how to enforce them [is difficult]"*. P9 explained that policy communication and enforcement became an additional duty:

We inform, we don't enforce. But then with a pandemic, there's a change in the directive where you kind of have to enforce. So just negotiating these new expectations has been quite interesting. - P9

Together, these findings support emergent research that feeling the need to be a source of information for others during the COVID-19 pandemic has contributed to the strain placed on essential workers [68].

4.2 Workers needed information to assess personal risk

Workers also needed information to make judgments about how their personal safety might be impacted by the ongoing crisis. Our participants explained that their primary concerns about their workplace safety were related to their health and financial risk.

4.2.1 Gauging risk of COVID-19 at work. Our participants felt that their jobs put them at higher risk of contracting COVID-19, especially for those who were routinely exposed to members of the public. For example, P6 described that she became “*super paranoid*,” and that after a shift of work she would “*almost burn my clothes*” to avoid contaminating her home.

Some participants reported that their workplace took actions to help them gauge their own risk at work. This can take the form of explaining how protocols protect workers. For example, P10 explained that his patients cannot wear masks for certain procedures, but he was still informed how he can protect himself in other ways during the treatment. Multiple participants mentioned that their workplaces would alert them if an employee had tested positive, and P5 reported this made her feel her employers were “*on top of things*.” However, these communications have to be made proactively by the employer, and participants had little visibility into whether these were accurate, which could be stressful. P7 felt that her workplace had “*failed*” at doing enough to keep employees safe, stating that she heard “*certain people have come in contact with [COVID-positive] people and they haven’t been notified*.”

A few participants we interviewed were highly anxious about the prospect of catching COVID-19 at work, and sought information outside of their workplaces to help them make safety decisions. P5 and P8 were deeply worried for their own safety or that of the people they lived with due to potential virus exposure during their job as public-facing employees. P8 described that when she started listening to the news about COVID-19 in March, she wore face masks at work before they became mandatory, but found that she “*looked ridiculous, because nobody was doing it*”. P5 also described how she sought information outside of work to protect herself:

If I see the numbers start to spike in [my area], I might decide not to go to work. Or I might decide to wash my hands more frequently, I would want that information so I can keep myself safe and my mom safe. - P5

4.2.2 Assessing financial risk. In addition to being concerned about their physical health, participants expressed concern about their job security. Although our participants were deemed “essential workers,” their workplaces were not immune from financial strain. Seven of our participants said that their work status was impacted due to the pandemic. A majority of these workers said their work hours had been cut, two expressed that their time at work had increased, P3 was laid off the week that we interviewed him, and P13 got a second job to supplement her income during the pandemic. Uncertain availability of paid working time was a source of stress for participants, as P9 explained that when she was down to zero hours one week, she was “*having a panic attack, thinking what do I do?*”, while P11 said that her “*life has changed both social and financially*” since the pandemic started. Thus, workplace communications about staffing changes or working hours could lead to additional stress. For example, P5 received an email with updates on low sales numbers at her store, and said she was “*hoping the store doesn’t go into a financial tailspin*.” Some participants also followed the news to understand if their workplace might be affected by the crisis. For example, P4 explained that he kept track of local reopening regulations because his workload was closely tied to the amount of tourists visiting the area.

4.3 Workers needed to stay informed of current events while maintaining mental health

Outside of work, our participants reported engaging in many of the information seeking behaviours more generally associated with crisis events. Consistent with prior crisis literature and findings about COVID-19 news behavior [48], 13 of 14 participants described that their news consumption increased, especially in the early stages of the pandemic. Even participants who generally were less interested in news, such as P1, exhibited this behavior:

I used to not follow the news at all. Or maybe not not at all, but not a lot. And with [COVID-19], it's just gone up because I'm curious about what's been happening. - P1

Especially in the early phases of the pandemic, participants reported exposing themselves to a variety of media sources. All participants identified social media as a source of information, with other frequently cited sources of information being national newspapers (10 interviews), local newspapers (8), email (6) and TV (6).

4.3.1 Rapid information exchange and collective sensemaking. Rapid information exchanges and collective sensemaking are known to be prominent behaviors following the outbreak of a crisis [64], and our participants exchanged in these practices both within and outside of work settings. As our participants physically attended work throughout the pandemic, they could exchange information about COVID-19 in-person. Six participants cited in-person discussions with co-workers as an important way they kept track of news about COVID-19. For example, P3 and P4 explained that they would naturally exchange information with coworkers:

We would talk about [COVID-19] on a daily basis, whenever we got to work. We'd talk how everyone is doing or how they're taking care of their kids, so it's mostly through the grapevine. Sometimes we would email each other stories from a local news website, but I'm not like checking the [local city] news or online news sources on a daily basis or anything like that. - P3

When we first get on to start the shift, we're usually just hanging around, saying "What's going on with this?," "What's happened?," "What's new?," "Do we know of any new restrictions for PPE?" You know, just anything we've heard. And so it's largely a think tank of "Oh, I heard this, Oh I read this." That sort of thing back and forth at the table for work, and less of a organized top down informational release. - P4

In P3's case, he noted that these conversations could replace having to seek out information on his own. Notably, the three first responders we interviewed all mentioned these types of daily information exchanges as a key source of information about COVID-19, which would take place during roll-call, when they started their shift, or during down time when waiting for a call. Some participants also mentioned that their workplaces facilitated rapid information exchange through providing them with online groups. For example, P9 named a company Facebook group as a key way that she discussed new COVID-19 updates with her coworkers, saying the content ranged from funny (a meme of Tom Hanks saying "shame on you" for not wearing a mask) to serious (discussions about which states were seeing outbreaks) to discussions of new company policies. Although P9 appreciated that this Facebook group was relevant to her and a good way to keep up with COVID-19 news, she was wary of posting on the group too much because she believed that "*at a time when we are overstaffed, this will be a great way to get rid of people for being in violation of [the social media policy]*." Many employees also engaged in rumoring behaviors through unofficial channels outside of their workplaces, especially at the local level.

Eight participants sought local updates through online community resources that were not official local news outlets. P3 said that he found *“the subreddits for specific cities pretty helpful to know the discussion”*, and P4 talked about his county’s busy local Facebook group:

Now there’s lots of discussion as to things going on and ranting opinion pieces, especially with COVID happening and no one can get outside. - P4

Some participants reported that their workplaces also gave them additional general COVID-19 information and public health guidelines that they could use in their personal lives. For example, P2 reported that his employer sent his team an email saying to *“take social distancing seriously, don’t go out and party, don’t go to the bars, and don’t go the gym”* because these activities are *“high risk.”* P4, a healthcare worker, felt that *“outside of work, I tend to be one of the people in my group that is most up to date on [COVID-19] simply because I work in the field.”* However, such additional information was not provided in most workplaces, so workers still felt a need to seek additional information outside of work. For example, P7 explained:

Maybe I like to be more informed about stuff... So I’m trying to keep myself informed of my own at home with everything in the media and making sure that I’m staying on top of things, but I don’t feel like our practice is keeping us informed. - P7

4.3.2 Dealing with the “Infodemic.” When workers sought additional information about COVID-19, they encountered contradictory and polarized information. Participants often decided whether they trusted information based on the perceived source, with some highlighting they trusted public individuals, governmental entities, specific journalistic institutions, or scientific institutions and public health organizations. Yet when asked why they trusted an institution, participants were often taken aback, and stated that either they had built up that trust over time, or that they assumed there was some governing process that vetted the information. P11 highlighted *“if I have to start doubting them, then I’d be having doubts about all information.”* Participants reported that they often saw contradictory versions of the same story presented, and this could make them unsure about what to believe. When prompted, participants often tried to reason through the motivations of an information source, which were usually perceived to be either political or financial.

You probably have to look at both sides, either with a grain of salt, or you should do your own research and just take your own opinion from your own research. - P7

[News about COVID-19 is] just clickbait so that they get more clicks and they make more money. You know, how they do that thing, where the more likes and more comments you get, the more money you can make? - P10

Participants often felt they were second-guessing motivations so much they were no longer sure what to trust. P1 said *“people just don’t know what to believe and that scares people.”* Participants thus perceived that it was challenging to cut through news commentary to obtain accurate information about COVID-19. For example, P10 found that he did not trust larger outlets because they were *“exaggerating facts”*. P11 held a similar view, and explained that the reason she prefers a particular news channel over others is that she had the impression *“they report facts, I’m not interested in people’s opinions.”*

4.3.3 Keeping up with COVID-19 news coverage led to information overload, stress and anxiety. Previous work has identified that volume and variety of information channels can contribute to feelings of information overload [10]. In line with other findings about COVID-19 and information exposure [66], most participants expressed feeling exhausted by keeping up with COVID-19 news. In a statement that seems to encompass the way many participants were feeling at the beginning of the pandemic, P2 expressed that he struggled because *“nothing is guaranteed, nothing is known,”*

the information changes so much so quickly.” Participants also felt that there was no break from COVID-19 information: “*I’m up at 4:30 in the morning, looking at news*” states P12, and P6 opines “*it’s just a constant, 24/7 stream, since it started.*”

The stress of information overload was particularly acute for participants who felt they were financially or physically vulnerable. Three participants described experiencing intense emotional distress near the beginning of the pandemic which they felt was a direct result of obsessing over the news cycle. P8 described experiencing a panic attack:

In the beginning, I was glued to the TV. I was watching and watching and I was getting overwhelmed. And I wasn’t noticing. Until I had a panic attack. I felt that I couldn’t breathe. I was — it was horrible. Never in my life, have I had something like that. - P8

In all three cases, the participant sensed an immediate threat from COVID-19: either someone in their care was vulnerable or they were vulnerable. P8 described how being around customers with unknown COVID-19 status made her fearful, stating “*I don’t know where they’ve been.*” P5 said that the reason her news consumption increased is because she wanted to know whether she should quit her job to protect her elderly mother, but that soon she received “*too much information, and it was just really making me anxious.*”

4.3.4 Participants developed coping strategies to limit their information intake. In a feeling many echoed, P6 stated “*I just want to take a break*” from COVID-19 information. Given the overload, many participants seemed to have reached or be afraid of reaching a breaking point, and they developed strategies for managing their information intake. Coping strategies were sometimes deliberate actions taken to limit stress and anxiety, whereas others developed them naturally or subconsciously. All participants showed some coping mechanism for dealing with excessive information, which included using humor to cope with serious news, deleting news or social media apps from their phone, and focusing on only local case counts instead of media narratives.

Consistent information distributed at work helped some participants manage their information intake. For example, P1 did not feel a need to keep close track of how the spread of the COVID-19 pandemic evolved, because he received daily updates at his workplace about the number of new local cases. P9 similarly stated that, because her work updated her with information from a variety of sources, she did not feel a need to actively research new COVID-19 information. Although P3 still researched COVID-19 outside of work, he felt that his work ensured he was the most up-to-date with new developments of his social group. Notably, in these cases, employees were receiving additional information about COVID-19 from their workplaces, and not only protocol updates.

5 DISCUSSION

This study explores what essential workers’ information needs were and how they navigated the COVID-19 information landscape in the months after the virus spread to the U.S. We introduce a framework of essential worker information needs that builds and ties into existing work in crisis informatics. Our results expose the potential benefits of receiving information through work, and the possible additional stressors placed on essential workers. Finally, the findings point to central points of failure and potential communication strategies that companies may seek to implement.

A key contribution of this paper is a framework of the information needs of essential workers during a sustained crisis (see Table 2). Studies into the experiences of essential workers during COVID-19 have consistently highlighted the importance of workplace crisis communication to limit disease transmission risk and negative mental health outcomes [27, 38, 51]. Separately, many studies have identified that conflicting information about COVID-19, uncertainty about the virus, and a politicized media climate could lead to information overload, anxiety, and stress [2, 23, 61, 69]. Through focusing on essential worker information needs, we explore how COVID-19 workplace

Table 2. Framework of Essential Worker Information Needs in a Sustained Crisis.

Essential Worker Information Need	Description	Information Source
1. Fulfill Job Requirements	Workers need to know how the crisis continually impacts the day-to-day fulfilment of their job duties.	Information provided primarily by employer.
2. Assess Personal Risk	Workers need to understand how to manage their own health and financial risks.	Information provided both by employer and outside media sources.
3. Keep up with Crisis News Coverage	Workers need to stay informed about crisis-related news while maintaining mental health.	Information provided primarily by outside media sources.

communication and outside information seeking behaviours could interact to either ease crisis information processing or become a source of additional stress. Based on our findings, we broadly grouped the information needs of essential workers to 1) obtaining information needed to fulfill job requirements, 2) assessing personal risk, and 3) keeping up with crisis news coverage. Failure to meet these information needs could result in finding job duties harder or impossible to complete, increased anxiety from fear of contracting the virus, sustained news exposure, or job status uncertainty, and information overload or avoidance. It is our hope that future researchers can use this framework to assess the adequacy of information provided to essential workers. In particular, our framework may be used to centralize survey-based assessments of COVID-19 information in the workplace. At scale, distinguishing these three information needs and how they are addressed by employers may also shed light into which industries may need more support in future crises. Practitioners and employers may equally use this framework to gauge their own workplace information practices.

Our findings also provide context for how the need to “keep up with crisis news coverage” plays out in a prolonged crisis. Previous work highlights that information-seeking behavior shifts as a population moves through temporal stages of disaster [33, 49, 55, 62], and social media activity remains high even during multi-day events [25, 32]. Emergent work conducted in the United Kingdom on people’s interaction with COVID-19 information posits an unfolding, intensifying, and maintaining stage of information discovery during the pandemic [40]. Our findings provide further evidence for the intensifying and maintaining stages, as we witness increased information seeking among participants, which create an environment of information overload where people develop coping strategies to sustain information intake in the long term. Our study focuses on the first two to five month period after COVID-19 was first detected in the U.S. Although this timeframe is longer than most crisis events explored in the crisis informatics literature, future studies may seek to gain insights into how these habits developed over an even longer time period.

Our framework provides a rationale for when essential workers might seek out work-related information outside of the workplace, and when seeking out external information is a potential point of failure or breakdown in communication. In ideal cases, all workers receive all the information needed to fulfill job requirements through their workplace. However, large-scale surveys of workers in multiple industries have found that protocols can sometimes be conflicting, not realistic in employee work environments, or that employees are not told how to enforce them [27, 42]. Such points of protocol breakdowns were also described in our interviews, and some participants reported that this could drive them to seek out additional information just to complete basic work duties. We

also find further evidence that essential workers in caretaking roles feel particular stress as a result of others relying on them for COVID-19 information, supporting trends in other work [47, 68, 71].

Another reason for employees to seek information outside of their workplace was the need for additional information about workplace safety. In our interviews, this often happened either when workers felt they were particularly vulnerable, or when workplaces failed to adequately safeguard workplace safety. We also find evidence that when essential workers do seek information about COVID-19 outside of their workplace, they may be particularly negatively impacted, especially if they feel personally vulnerable and have to continually expose themselves to increased risks in public. This finding is in line with survey studies that have linked high COVID-19 fear and low perceived safety in essential workplaces with negative mental health outcome [31]. In this context, we would posit that seeking information outside of the workplace could be a compounding reason for why workers who perceive their workplaces as more unsafe and themselves to be more at risk have poorer mental health during a sustained crisis. Future research may seek to empirically validate this relationship, as well as the relationship between worker information seeking behaviours during a crisis and job security.

Nonetheless, we also find some evidence that going to work in person could help workers manage the COVID-19 “infodemic” in ways that were inaccessible to remote workers. Previous work has shown that there are particular benefits to in-person rumoring behaviors as a sensemaking process, and that interpersonal communications can help ease crisis-related stress [77]. Our participants described daily acts of sharing news and updates with each other in-person, and some counted this as one of the key ways they kept up-to-date with COVID-19 news. Additionally, some workers felt that they could rely on the COVID-19 updates they received at work as their primary information source about the crisis, and this helped them limit their overall information intake. Scholars fear that sustained exposure to COVID-19 information may lead to information fatigue or avoidance [15, 35, 59], and we see some evidence that participants who have otherwise stopped keeping up with COVID-19 information still receive enforced streams of information through work. This observation suggests that workplaces may provide a way to help combat the adverse effects of information avoidance or information fatigue from prolonged crisis information exposure.

At the same time, the types of information streams supplied to employees varied by occupation type, and some workplaces were set up to more effectively fulfill worker information needs than others. While healthcare workers are trained to reason about public health information, the same is not true of other essential industries [52]. Though few studies compare experiences of essential workers across industries, one survey contrasted healthcare workers with non-healthcare essential workers and found that non-healthcare essential workers are more worried about the possibility of contracting COVID-19, and report worse emotional experiences [73]. The authors hypothesize that one reason for this discrepancy may be that non-healthcare essential workers are less informed about safety practices at work or that safety protocols are not adhered to adequately in their workplaces. Although we do not have enough participants to make comparative claims, the current study provides further evidence that feeling unsure about which sources to trust and not feeling safe at work contribute to higher information overload and increased stress.

As well as healthcare workers, our findings may indicate that first responder occupations also foster distinct information behaviors. In particular, first responders may be more used to coping with high-pressure situations, and first response workplaces may be more adequately setup to cope with and distribute information about rapidly changing crises. We see this play out in our study as some professions seemed to have daily meetings that were set up for information exchange (e.g. P1 has roll call at the start of the work day, P4 has a briefing meeting at the start of each shift). These meetings seemed to naturally lend themselves to exchanging information about the developing crisis, and contributed to workers feeling more informed generally, but did not happen across the

board for workers in other lines of work. Further occupation-specific work is needed to identify the interplay between occupation type and how much their workplace acts as an important and reliable stream of COVID-19 information. Based on our findings, there is some evidence to suggest that different workplaces are unequally set up to provide rapid, high pressure information.

The information needs highlighted in this study point to promising directions for future workplace crisis communications. Workplace inadequacy to inform workers about how COVID-19 impacts health and safety has been framed as a “moral injury” [22]. Material about how to communicate COVID-19 procedures to workers highlights the importance of sharing guidance in accessible ways through multiple channels [1, 50]. We find that the more workplaces are able to satisfy essential worker information needs in a reliable, timely, and comprehensive way, the less employees will feel inclined to turn to other sources, which can have negative mental health consequences. In fact, our findings imply that workplaces may consider providing additional information about COVID-19 beyond what is required for the fulfilment of job duties, as this strategy might help to prevent information overload outside of work. When informing workers about protocol changes and job requirements, we find evidence that facilitating information exchanges (either through in-person settings, or online using WhatsApp or Facebook groups) can allow workers to clarify unrealistic policies and provide feedback. However, we acknowledge that these systems must be implemented in ways that respect worker privacy and work-life boundaries. Together, these findings imply that workplaces taking on the task of processing, making sense of new information, and making realistic decisions about how new information should impact working environments helped to alleviate how much workers worried about COVID-19 in and outside of work.

6 LIMITATIONS

Crisis research often requires amending usual collection and analysis strategies, which can mean smaller sample sizes, rapidly shifting frames that make comparison hard, and opportunistic sampling strategies [3]. Some of these issues are reflected in the current research. We recruited some participants using Facebook Ads and ran interviews via video calls, so our sample is biased towards participants who have access to the internet and use Facebook regularly. We also ran ads and conducted interviews in English, so only English-speakers are represented in this study, though we note multiple participants stated they emigrated from another country. Another trade-off we made was to collect fewer sensitive demographics to speed up the recruitment process, which limits how much this study can tell us about how the race, income, and political leanings of participants inform their interactions with their information work and practices. We also focused this study on the U.S., which may limit the broad applications of our findings to other countries.

7 CONCLUSION

The COVID-19 pandemic has had a widespread impact on all aspects of daily life in the U.S. for over a year. During quarantine, a heavy burden fell to essential workers across industries as they continued in-person job duties despite personal risk. In this study, we interviewed 14 essential workers in the U.S. about their COVID-19 information practices. We propose that essential workers in times of sustained crisis needed to obtain information to 1) fulfill their job requirements, 2) assess personal risk, and 3) keep up with crisis news coverage. We identify that workplace crisis communications satisfy some, but not all essential worker information needs. Our work also shows how the unique sustained nature of the COVID-19 crisis event led to information overload. Extending prior findings, we observe that the sustained nature of COVID-19 meant that participants were unable to move on from the crisis until they developed personal coping processes to help manage the information. Our findings suggest that workplace communications can act as a mediating force that can potentially alleviate the additional load of continually seeking outside information about COVID-19.

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REFERENCES

- [1] Cybersecurity & Infrastructure Agency. 2020. *Guidance on the Essential Critical Infrastructure Workforce: Ensuring Community and National Resilience in COVID-19 Response Version 4.0*. Technical Report. https://www.cisa.gov/sites/default/files/publications/ECIW_4.0_Guidance_on_Essential_Critical_Infrastructure_Workers_Final3_508_0.pdf
- [2] Sameera Tahira Ahmed. 2020. Managing News Overload (MNO): The COVID-19 Infodemic. *Information* 11, 8 (2020), 375. <https://doi.org/10.3390/info11080375>
- [3] Karen Albright. 2009. On Unexpected Events. In *Research Confidential*, Eszter Hargittai (Ed.). University of Michigan Press, 164–191.
- [4] Rana Almaghrabi, Huda Alfaradi, Wejdan Hebshi, and Mohammed Albaadani. 2020. Healthcare workers experience in dealing with Coronavirus (COVID-19) pandemic. *Saudi Medical Journal* 41 (2020), 657–660. <https://doi.org/10.15537/smj.2020.6.25101>
- [5] Scott L. Althaus. 2002. American News Consumption during Times of National Crisis. *PS: Political Science and Politics* 35, 3 (2002), 517–521. <https://www.jstor.org/stable/1554680>
- [6] Maggie Astor. 2020. Four Months After First Case, U.S. Death Toll Passes 100,000. *The New York Times* (2020). <https://www.nytimes.com/2020/05/27/us/coronavirus-live-news-updates.html>
- [7] Lucinda Austin, Brooke Fisher Liu, and Yan Jin. 2020. How Audiences Seek Out Crisis Information: Exploring the Social-Mediated Crisis Communication Model. *Journal of Applied Communication Research* 40, 2 (2020), 188–207. <https://doi.org/10.1080/00909882.2012.654498>
- [8] Marissa G. Baker, Trevor K. Peckham, and Noah S. Seixas. 2020. Estimating the burden of United States workers exposed to infection or disease: A key factor in containing risk of COVID-19 infection. *PLOS ONE* 15, 4 (2020). <https://doi.org/10.1371/journal.pone.0232452>
- [9] Soham Bandyopadhyay, Ronnie E. Baticulon, Murtaza Kadhum, Muath Alser, Daniel K. Ojuka, Yara Badereddin, Archith Kamath, Sai Arathi Parepalli, Grace Brown, Sara Iharchane, Sofia Gandino, Zara Markovic-Obiago, Samuel Scott, Emery Manirambona, Asif Machhada, Aditi Aggarwal, Lydia Benazaize, Mina Ibrahim, David Kim, Isabel Tol, Elliott H. Taylor, Alexandra Knighton, Dorothy Bbaale, Duha Jasim, Heba Alghoul, Henna Reddy, Hibatullah Abuelgasim, Kirandeep Saini, Alicia Sigler, Leenah Abuelgasim, Mario Moran-Romero, Mary Kumarendran, Najlaa Abu Jamie, Omaima Ali, Raghav Sudarshan, Riley Dean, Rumi Kisyova, Sonam Kelzang, Sophie Roche, Tazin Ahsan, Yethrib Mohamed, Andile Maqhawe Dube, Grace Paida Gwini, Rashidah Gwokya, Robin Brown, Mohammad Rabiul Karim Khan Papon, Zoe Li, Salvador Sun Ruzats, Somy Charuvila, Noel Peter, Khalil Khalidy, Nkosikhona Moyo, Osaid Alser, Arielis Solano, Eduardo Robles-Perez, Aiman Tariq, Mariam Gaddah, Spyros Kolovos, Faith C. Muchemwa, Abdullah Saleh, Amanda Gosman, Rafael Pinedo-Villanueva, Anant Jani, and Roba Khundkar. 2020. Infection and mortality of healthcare workers worldwide from COVID-19: a systematic review. *BMJ Global Health* 5, 12 (2020). <https://doi.org/10.1136/bmjgh-2020-003097>
- [10] David Bawden and Lyn Robinson. 2009. The dark side of information: overload, anxiety and other paradoxes and pathologies. *Journal of Information Science* 35, 2 (2009), 180–191. <https://doi.org/10.1177/0165551508095781>
- [11] Francine D. Blau, Josefine Koebe, and Pamela A. Meyerhofer. 2021. Who are the essential and frontline workers? *Business Economics* 56, 3 (2021), 168–178. <https://doi.org/10.1057/s11369-021-00230-7>
- [12] Raquel Brandini De Boni, Vicent Balanzá-Martínez, Jurema Correa Mota, Taiana De Azevedo Cardoso, Pedro Ballester, Beatriz Atienza-Carbonell, Francisco I. Bastos, and Flavio Kapczinski. 2020. Depression, Anxiety, and Lifestyle Among Essential Workers: A Web Survey From Brazil and Spain During the COVID-19 Pandemic. *Journal of Medical Internet Research* 22, 10 (2020). <https://doi.org/10.2196/22835>
- [13] Virginia Braun and Victoria Clarke. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology* 3, 2 (2006), 77–101. <https://doi.org/10.1191/1478088706qp0630a>
- [14] Axel Bruns, Jean Burgess, Kate Crawford, and Frances Shaw. 2012. *#qldfloods and @QPSMedia: Crisis communication on Twitter in the 2011 South East Queensland floods*. Technical Report. <https://eprints.qut.edu.au/48241/>
- [15] I. Buneviciene, R. Bunevicius, S. Bagdonas, and A. Bunevicius. 2021. COVID-19 media fatigue: predictors of decreasing interest and avoidance of COVID-19-related news. *Public Health* 196 (2021), 124–128. <https://doi.org/10.1016/j.puhe.2021.05.024>
- [16] CDC COVID-19 Response Team, Michelle A Jorden, Sarah L Rudman, Elsa Villarino, Stacey Hoferka, Megan T Patel, Kelley Bemis, Crista R Simmons, Megan Jespersen, et al. 2020. Evidence for limited early spread of COVID-19 within the United States, January–February 2020. *Morbidity and Mortality Weekly Report* 69, 22 (2020), 680. <https://doi.org/10.15585/mmwr.mm6922e1>

- [17] Caitlin Ceryes, Joelle Robinson, Erin Biehl, Andrea L. Wirtz, Daniel J. Barnett, and Roni Neff. 2021. Frequency of Workplace Controls and Associations With Safety Perceptions Among a National Sample of US Food Retail Workers During the COVID-19 Pandemic. *Journal of Occupational and Environmental Medicine* 63, 7 (2021), 557–564. <https://doi.org/10.1097/JOM.0000000000002218>
- [18] Lauren Chambers. 2020. *Data show COVID-19 is hitting essential workers and people of color hardest*. Retrieved 2022 from <https://data.aclum.org/2020/04/07/covid-19-disproportionately-affects-vulnerable-populations-in-boston/>
- [19] Seong Eun Cho, Kyujin Jung, and Han Woo Park. 2013. Social Media Use during Japan's 2011 Earthquake: How Twitter Transforms the Locus of Crisis Communication. *Media International Australia* 149, 1 (2013), 28–40. <https://doi.org/10.1177/1329878X1314900105>
- [20] Russell Rowe Dynes. 1970. *Organized Behavior in Disaster*. Heath Lexington Books.
- [21] Rebecca K. Fielding-Miller, Maria E. Sundaram, and Kimberly Brouwer. 2020. Social determinants of COVID-19 mortality at the county level. *PLOS ONE* 15, 10 (2020). <https://doi.org/10.1371/journal.pone.0240151>
- [22] Joanna Gaitens, Marian Condon, Eseosa Fernandes, and Melissa McDiarmid. 2021. COVID-19 and Essential Workers: A Narrative Review of Health Outcomes and Moral Injury. *International Journal of Environmental Research and Public Health* 18, 4 (2021), 1446. <https://doi.org/10.3390/ijerph18041446>
- [23] Antonis Gardikiotis, Evanthia Malinaki, Charalambos Charisiadis-Tsitlakidis, Aristeia Protonotariou, Stamatis Archontis, Anna Lampropoulou, Irini Maraki, Konstantina Papatheodorou, and George Zafeiriou. 2021. Emotional and Cognitive Responses to COVID-19 Information Overload under Lockdown Predict Media Attention and Risk Perceptions of COVID-19. *Journal of Health Communication* 26, 6 (2021), 434–442. <https://doi.org/10.1080/10810730.2021.1949649>
- [24] Jevay Grooms, Alberto Ortega, Joaquin A.-A. Rubalcaba, and Edward Vargas. 2021. Racial and Ethnic Disparities: Essential Workers, Mental Health, and the Coronavirus Pandemic. *The Review of Black Political Economy* (2021). <https://doi.org/10.1177/00346446211034226>
- [25] Xiangyang Guan and Cynthia Chen. 2014. Using social media data to understand and assess disasters. *Natural Hazards* 74, 2 (2014), 837–850. <https://doi.org/10.1007/s11069-014-1217-1>
- [26] Christine Hagar. 2010. Farmers' search for information during the UK foot-and-mouth disease crisis- what can we learn? *Australian Journal of Emergency Management* (2010), 38–44.
- [27] Elizabeth Halcomb, Anna Williams, Christine Ashley, Susan McInnes, Catherine Stephen, Kaara Calma, and Sharon James. 2020. The support needs of Australian primary health care nurses during the COVID-19 pandemic. *Journal of Nursing Management* 28, 7 (2020), 1553–1560. <https://doi.org/10.1111/jonm.13108>
- [28] P. Sol Hart, Sedona Chinn, and Stuart Soroka. 2020. Politicization and Polarization in COVID-19 News Coverage. *Science Communication* 42, 5 (2020), 679–697. <https://doi.org/10.1177/1075547020950735>
- [29] Y. Linlin Huang, Kate Starbird, Mania Orand, Stephanie A. Stanek, and Heather T. Pedersen. 2015. Connected Through Crisis: Emotional Proximity and the Spread of Misinformation Online. In *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing* (New York, NY, USA, 2015) (CSCW '15). 969–980. <https://doi.org/10.1145/2675133.2675202>
- [30] Gallup Inc. 2020. *U.S. Workers Discovering Affinity for Remote Work*. <https://news.gallup.com/poll/306695/workers-discovering-affinity-remote-work.aspx>
- [31] Melissa Janson, Jill D. Sharkey, and Daniel A. del Cid. 2021. Predictors of Mental Health Outcomes in Grocery Store Workers amid the COVID-19 Pandemic and Implications for Workplace Safety and Moral Injury. *International Journal of Environmental Research and Public Health* 18, 16 (2021), 8675. <https://doi.org/10.3390/ijerph18168675>
- [32] Eunji Kim, Michael E. Shepherd, and Joshua D. Clinton. 2020. The effect of big-city news on rural America during the COVID-19 pandemic. *Proceedings of the National Academy of Sciences* 117, 36 (2020), 22009–22014. <https://doi.org/10.1073/pnas.2009384117>
- [33] Marina Kogan, Leysia Palen, and Kenneth M. Anderson. 2015. Think Local, Retweet Global: Retweeting by the Geographically-Vulnerable during Hurricane Sandy. In *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing* (New York, NY, USA, 2015) (CSCW '15). 981–993. <https://doi.org/10.1145/2675133.2675218>
- [34] Jing Xuan Koh and Tau Ming Liew. 2020. How loneliness is talked about in social media during COVID-19 pandemic: Text mining of 4,492 Twitter feeds. *Journal of psychiatric research* (2020). <https://doi.org/10.1016/j.jpsychires.2020.11.015>
- [35] Philip Kheng-Keah Koh, Ling Ling Chan, and Eng-King Tan. 2020. Messaging fatigue and desensitisation to information during pandemic. *Archives of Medical Research* 51, 7 (2020), 716. <https://doi.org/10.1016/j.arcmed.2020.06.014>
- [36] Jianbo Lai, Simeng Ma, Ying Wang, Zhongxiang Cai, Jianbo Hu, Ning Wei, Jiang Wu, Hui Du, Tingting Chen, Ruiting Li, Huawei Tan, Lijun Kang, Lihua Yao, Manli Huang, Huaifen Wang, Gaohua Wang, Zhongchun Liu, and Shaohua Hu. 2020. Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. *JAMA Network Open* 3, 3 (2020). <https://doi.org/10.1001/jamanetworkopen.2020.3976>
- [37] Fan-Yun Lan, Christian Suharlim, Stefanos N Kales, and Justin Yang. 2020. Association between SARS-CoV-2 infection, exposure risk and mental health among a cohort of essential retail workers in the USA. *Occupational and Environmental*

- Medicine* (2020). <https://doi.org/10.1136/oemed-2020-106774>
- [38] Helena Lee. 2021. Changes in workplace practices during the COVID-19 pandemic: the roles of emotion, psychological safety and organisation support. *Journal of Organizational Effectiveness: People and Performance* 8, 1 (2021), 97–128. <https://doi.org/10.1108/JOEPP-06-2020-0104>
- [39] Shaobo (Kevin) Li, Zhe Zhang, Yue Liu, and Sharon Ng. 2021. The closer I am, the safer I feel: The “distance proximity effect” of COVID-19 pandemic on individuals’ risk assessment and irrational consumption. *Psychology & Marketing* 38, 11 (2021), 2006–2018. <https://doi.org/10.1002/mar.21552>
- [40] Annemaree Lloyd and Alison Hicks. 2021. Contextualising risk: the unfolding information work and practices of people during the COVID-19 pandemic. *Journal of Documentation* (2021). <https://doi.org/10.1108/JD-11-2020-0203>
- [41] Wen Lu, Hang Wang, Yuxing Lin, and Li Li. 2020. Psychological status of medical workforce during the COVID-19 pandemic: A cross-sectional study. *Psychiatry Research* 288 (2020). <https://doi.org/10.1016/j.psychres.2020.112936>
- [42] Brian Mayer, Mona Arora, Sabrina Helm, and Melissa Barnett. 2021. Essential but Ill-Prepared: How the COVID-19 Pandemic Affects the Mental Health of the Grocery Store Workforce. *Public Health Reports* (2021). <https://doi.org/10.1177/00333549211045817>
- [43] Grace McCormack, Christopher Avery, Ariella Kahn-Lang Spitzer, and Amitabh Chandra. 2020. Economic Vulnerability of Households With Essential Workers. *JAMA* 324, 4 (2020), 388–390. <https://doi.org/10.1001/jama.2020.11366>
- [44] Marcelo Mendoza, Barbara Poblete, and Carlos Castillo. 2010. Twitter under crisis: can we trust what we RT?. In *Proceedings of the First Workshop on Social Media Analytics* (New York, NY, 2010) (SOMA ’10). 71–79. <https://doi.org/10.1145/1964858.1964869>
- [45] Rasmus Kleis Nielsen, Richard Fletcher, Nic Newman, Scott Brennen, and Philip N. Howard. 2020. *Navigating the ‘infodemic’: how people in six countries access and rate news and information about coronavirus*. <https://reutersinstitute.politics.ox.ac.uk/infodemic-how-people-six-countries-access-and-rate-news-and-information-about-coronavirus>
- [46] A. Michael Noll. 2003. *Crisis Communications: Lessons from September 11*. Rowman & Littlefield.
- [47] Mathew Nyashanu, Farai Pfende, and Mandu Ekpenyong. 2020. Exploring the challenges faced by frontline workers in health and social care amid the COVID-19 pandemic: experiences of frontline workers in the English Midlands region, UK. *Journal of Interprofessional Care* 34, 5 (2020), 655–661. <https://doi.org/10.1080/13561820.2020.1792425>
- [48] Jakob Ohme, Mariek M. P. Vanden Abeele, Kyle Van Gaeveren, Wouter Durnez, and Lieven De Marez. 2020. Staying Informed and Bridging “Social Distance”: Smartphone News Use and Mobile Messaging Behaviors of Flemish Adults during the First Weeks of the COVID-19 Pandemic. *Socius* 6 (2020). <https://doi.org/10.1177/2378023120950190>
- [49] Rahmi Rahmi, Hideo Joho, and Tetsuya Shirai. 2019. An analysis of natural disaster-related information-seeking behavior using temporal stages. *Journal of the Association for Information Science and Technology* 70, 7 (2019), 715–728. <https://doi.org/10.1002/asi.24155>
- [50] Athena K. Ramos. 2020. *Essential Workers and Risk for COVID-19: Experiences from the Meat Processing Industry*. Retrieved 2022 from <https://www.unomaha.edu/college-of-arts-and-sciences/ollas/research/ollas-blog-oct-2020.php>
- [51] Athena K. Ramos, Abbey Lowe, Jocelyn J. Herstein, Natalia Trinidad, Marcela Carvajal-Suarez, Sophia Quintero, Diana Molina, and Shelly Schwedhelm. 2021. A Rapid-Response Survey of Essential Workers in Midwestern Meatpacking Plants: Perspectives on COVID-19 Response in the Workplace. *Journal of Environmental Health* 84, 1 (2021), 16–25.
- [52] Athena K. Ramos, Abigail E. Lowe, Jocelyn J. Herstein, Shelly Schwedhelm, Kelly K. Dineen, and John J. Lowe. 2021. Invisible No More: The Impact of COVID-19 on Essential Food Production Workers. *Journal of Agromedicine* 25, 4 (2021), 378–382. <https://doi.org/10.1080/1059924X.2020.1814925>
- [53] Rashawn Ray and Fabio Rojas. 2020. *Inequality During the Coronavirus Pandemic - Contexts*. Retrieved 2022 from <https://contexts.org/blog/inequality-during-the-coronavirus-pandemic/>
- [54] Kevin Real. 2008. Information Seeking and Workplace Safety: A Field Application of the Risk Perception Attitude Framework. *Journal of Applied Communication Research* 36, 3 (2008), 339–359. <https://doi.org/10.1080/00909880802101763>
- [55] Barbara Ryan. 2018. A model to explain information seeking behaviour by individuals in the response phase of a disaster. *Library & Information Science Research* 40, 2 (2018), 73–85. <https://doi.org/10.1016/j.lisr.2018.05.001>
- [56] Elena Savoia, Maxwell Su, Rachael Pilch-Loeb, Evelyn Masterson, and Marcia A Testa. 2021. COVID-19 vaccine early skepticism, misinformation and informational needs among essential workers in the USA. *International Journal of Environmental Research and Public Health* 18, 24 (2021). <https://doi.org/10.3390/ijerph182413244>
- [57] Matthew Seeger, Steven Venette, R. Ulmer, and Timothy Sellnow. 2002. Media use, information seeking and reported needs in post crisis contexts. 53–64.
- [58] Irina Shklovski, Leysia Palen, and Jeannette Sutton. 2008. Finding community through information and communication technology in disaster response. In *Proceedings of the 2008 ACM conference on Computer Supported Cooperative Work* (San Diego, CA, 2008) (CSCW’08). 127–136. <https://doi.org/10.1145/1460563.1460584>
- [59] Alexander Skulmowski and Bernhard Standl. 2021. COVID-19 information fatigue? A case study of a German university website during two waves of the pandemic. *Human Behavior and Emerging Technologies* 3, 3 (2021), 350–356. <https://doi.org/10.1002/hbe2.260>

- [60] Andrew Soergel. 2020. *Unemployment Highest Since Great Depression as Coronavirus Collapses Labor Market Collapses*. Retrieved 2020 from <https://www.usnews.com/news/national-news/articles/2020-05-08/unemployment-highest-since-great-depression-as-coronavirus-collapses-labor-market>
- [61] Saira Hanif Soroya, Ali Farooq, Khalid Mahmood, Jouni Isoaho, and Shan-e Zara. 2021. From information seeking to information avoidance: Understanding the health information behavior during a global health crisis. *Information Processing & Management* 58, 2 (2021). <https://doi.org/10.1016/j.ipm.2020.102440>
- [62] Patric R. Spence, Kenneth A. Lachlan, Xialing Lin, and Maria del Greco. 2015. Variability in Twitter Content Across the Stages of a Natural Disaster: Implications for Crisis Communication. *Communication Quarterly* 63, 2 (2015), 171–186. <https://doi.org/10.1080/01463373.2015.1012219>
- [63] Emma S Spiro, Christopher L DuBois, and Carter T Butts. 2012. Waiting for a Retweet: Modeling Waiting Times in Information Propagation. *NIPS workshop of social networks and social media conference*. 12 (2012).
- [64] Emma S. Spiro, Sean Fitzhugh, Jeannette Sutton, Nicole Pierski, Matt Greczek, and Carter T. Butts. 2012. Rumoring during extreme events: a case study of deepwater horizon 2010. In *Proceedings of the 4th Annual ACM Web Science Conference* (New York, NY, USA, 2012-06-22) (*WebSci '12*). 275–283. <https://doi.org/10.1145/2380718.2380754>
- [65] AJMC Staff. 2020. *A Timeline of COVID-19 Developments in 2020*. Retrieved 2022 from <https://www.ajmc.com/view/a-timeline-of-covid19-developments-in-2020>
- [66] Kevin Stainback, Brittany N. Hearne, and Monica M. Trieu. 2020. COVID-19 and the 24/7 News Cycle: Does COVID-19 News Exposure Affect Mental Health? *Socius* 6 (2020). <https://journals-sagepub-com.proxy.library.cornell.edu/doi/full/10.1177/2378023120969339>
- [67] Kate Starbird and Leysia Palen. 2012. (How) will the revolution be retweeted? information diffusion and the 2011 Egyptian uprising. In *Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work* (New York, NY, USA, 2012) (*CSCW '12*). 7–16. <https://doi.org/10.1145/2145204.2145212>
- [68] Madeline R. Sterling, Emily Tseng, Anthony Poon, Jacklyn Cho, Ariel C. Avgar, Lisa M. Kern, Claire K. Ankuda, and Nicola Dell. 2020. Experiences of Home Health Care Workers in New York City During the Coronavirus Disease 2019 Pandemic: A Qualitative Analysis. *JAMA Internal Medicine* 180, 11 (2020), 1453–1459. <https://doi.org/10.1001/jamainternmed.2020.3930>
- [69] Sigrid Stjernswärd, Anna-Karin Ivert, and Stinne Glasdam. 2021. Perceptions and effects of COVID-19 related information in Denmark and Sweden – a web-based survey about COVID-19 and social media. *Journal of Public Health* (2021). <https://doi.org/10.1007/s10389-021-01539-5>
- [70] Anselm Strauss and Juliet M. Corbin. 1997. *Grounded Theory in Practice*. SAGE.
- [71] Niuniu Sun, Luoqun Wei, Suling Shi, Dandan Jiao, Runluo Song, Lili Ma, Hongwei Wang, Chao Wang, Zhaoguo Wang, Yanli You, Shuhua Liu, and Hongyun Wang. 2020. A qualitative study on the psychological experience of caregivers of COVID-19 patients. *American Journal of Infection Control* 48, 6 (2020), 592–598. <https://doi.org/10.1016/j.ajic.2020.03.018>
- [72] Yla Tausczik, Kate Faasse, James W. Pennebaker, and Keith J. Petrie. 2012. Public Anxiety and Information Seeking Following the H1N1 Outbreak: Blogs, Newspaper Articles, and Wikipedia Visits. *Health Communication* 27, 2 (2012), 179–185. <https://doi.org/10.1080/10410236.2011.571759>
- [73] Wei Lin Toh, Denny Meyer, Andrea Phillipou, Eric J Tan, Tamsyn E Van Rheenen, Erica Neill, and Susan L Rossell. 2021. Mental health status of healthcare versus other essential workers in Australia amidst the COVID-19 pandemic: Initial results from the collate project. *Psychiatry Research* 298 (2021). <https://doi.org/10.1016/j.psychres.2021.113822>
- [74] Sherry Towers, Shehzad Afzal, Gilbert Bernal, Nadya Bliss, Shala Brown, Baltazar Espinoza, Jasmine Jackson, Julia Judson-Garcia, Maryam Khan, Michael Lin, Robert Mamada, Victor M. Moreno, Fereshteh Nazari, Kamaldeen Okuneye, Mary L. Ross, Claudia Rodriguez, Jan Medlock, David Ebert, and Carlos Castillo-Chavez. 2020. Mass Media and the Contagion of Fear: The Case of Ebola in America. *PLOS ONE* 10, 6 (2020). <https://doi.org/10.1371/journal.pone.0129179>
- [75] Victoria Williamson, Dominic Murphy, and Neil Greenberg. 2020. COVID-19 and experiences of moral injury in front-line key workers. *Occupational Medicine* 70, 5 (2020), 317–319. <https://doi.org/10.1093/occmed/kqaa052>
- [76] Eliza Lai-Yi Wong, Kai-Fai Ho, Samuel Yeung-Shan Wong, Annie Wai-Ling Cheung, Peter Sen-Yung Yau, Dong Dong, and Eng-Kiong Yeoh. 2020. Views on Workplace Policies and its Impact on Health-Related Quality of Life During Coronavirus Disease (COVID-19) Pandemic: Cross-Sectional Survey of Employees. *International Journal of Health Policy and Management* (2020). <https://doi.org/10.34172/ijhpm.2020.127>
- [77] Sifan Xu. 2018. Crisis communication within a community: Bonding, coping, and making sense together. *Public Relations Review* 44, 1 (2018), 84–97. <https://doi.org/10.1016/j.pubrev.2017.10.004>
- [78] Kai-Cheng Yang, Francesco Pierri, Pik-Mai Hui, David Axelrod, Christopher Torres-Lugo, John Bryden, and Filippo Menczer. 2021. The COVID-19 Infodemic: Twitter versus Facebook. *Big Data & Society* 8, 1 (2021). <https://doi.org/10.1177/20539517211013861>

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