



## Short Communication

## From what I've heard, this is bad: An examination of Americans' source preferences and information seeking during the COVID-19 pandemic

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## ABSTRACT

As an extension of a prior research, the current study examines the relationships among source preferences, need for cognition, information seeking, and protective actions during the COVID-19 pandemic. Results derived from a nationally representative sample of American respondents suggest that need for cognition is not a significant predictor of source preferences, mitigation behaviors, or specific risk perceptions. However, those with higher need for cognition, and those who were more reliant on television and internet media felt an elevated sense of overall risk. Individuals who collected information from radio, social media, and interpersonal interactions expressed higher levels of specific risk probability, while those reliant on television and websites reported higher levels of general risk perceptions and more mitigation behaviors. Theoretical and managerial implications are discussed.

The COVID-19 pandemic has presented widespread social, political, and economic challenges across the world. While more common disasters and health risks such as wildfires, hurricanes, or earthquakes allow us to build a knowledge base of best practices in emergency response, the COVID-19 pandemic is a completely novel crisis event in the information age. As conditions and health recommendations have changed over the course of the pandemic, a near constant barrage of information concerning these factors has inundated the American public. This blend of urgency, longevity, and uncertainty makes communicating essential information about the virus an arduous task for crisis communicators and public health officials.

As both an aid and a hindrance to this task, the global addition of social media and the internet allows individuals an abundance of sources to consult for information about the pandemic. Unfortunately, having millions of opinions available to consider from experts and non-experts alike has led to sentiments of uncertainty and confusion, spurring an unsettling range of behavior related to the COVID-19 pandemic [18,28].

The current study aims to improve the understanding of how the medium through which individuals choose to consume information, our *source preferences*, may be the antecedents of COVID-19 behavior. Through exploring the relationships among source preference and need for cognition, risk perception, time spent seeking information, and protective actions, results from this study will provide a more comprehensive picture of the average American's interaction with COVID-19 media. These results are discussed

alongside both their implications for emergency managers and their broader theoretical relevance.

## 1. Crisis and risk communication

Although related, crisis and risk communication exist as two separate areas of inquiry. Risk communication focuses on identified and potential future threats to people, structures, or systems and works to mitigate these issues; by way of comparison, crisis communication begins when a risk is actualized. Scholars have proposed that the most effective crisis communication occurs when messaging matches the “stage” that a crisis has reached [32]. However, each crisis exists as an uncertain, potentially chaotic event that requires quick decision making on the part of officials, often without accurate or complete information. Researchers have focused on both emergency management officials and organizations, as well as impacted individuals in their attempt to understand how a crisis can be best managed.

The extant literature is filled with case studies focused on crisis communication and how well such information is received during natural disasters (e.g. [33]), human crises such as the September 11th terrorist attacks (e.g. [40]), and infectious disease outbreaks (e.g. [22]). Much of the work on pandemic crisis communication has occurred after the peak of a crisis has passed, typically through content analyses, interviews, and social media data mining [38]. However, Koskan et al. [13], in studying college students during the height of the H1N1 outbreak, found while most students were

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initially alerted to the threat through mass media, participants relied more heavily on interpersonal communication to help them “filter and respond to such information” (p. 426). Researchers also noted that emergency preparedness information when mediated in nature (through television, radio, internet, etc.), must come from a trusted source to be effective [13]. This is consistent with previous work that has stressed the importance of clear, scientific, and transparent communication during a crisis event to improve the likelihood of positive health outcomes [19].

Other infectious disease outbreaks have longer historical contexts. Within the United States, vaccination hesitancy has continued to plague public health officials – between 2014 and 2015, the United States experienced 111 cases of the measles despite the disease having been declared “eradicated” in 2001, Broniatowski et al. [6]. Researchers studied the extent to which different types of stories about the measles outbreak were shared on Facebook and found that stories that had an underlying “gist” or “bottom-line meaning” were the most frequently shared articles. While not a direct effect, information available on social media, especially that which is widely shared, may ultimately have an effect on parental decision making related to vaccinations. Further, with regard to public health officials, the importance of focusing on the most salient points may be particularly important.

Similarly, scholars studying the Hepatitis A outbreak in San Diego, California, found that not only was information available about the outbreak on social media (Twitter), but also that misinformation was being widely shared [43]. The researchers also noted that often on Twitter, the flow of information was mostly from authorities to the public, potentially driving the content being shared online that lamented the lack of government response and dialogue [43]. This study suggested that during critical events, officials can use social media sites like Twitter to not only spread information, but also counter misinformation real time and in doing so, create conversations with the public. Oren et al. [43] also noted the importance of reaching out to those groups most at risk such as the homeless, but the difficulties inherent in connecting with groups with limited resources.

Facebook has also been studied as a form of communication during epidemics. Lwin et al. [22] analyzed the posts made by three main Singapore health agencies during the 2016 Zika outbreak. Results indicated that Facebook was used as a communication tool throughout the year suggesting that social media's role during crises is becoming more intentional and common [22]. The study also found that beyond providing strategic health information related to the ongoing Zika threat, Facebook posts were also used to promote community responsibility and applaud the public for their cooperation [22]. Infectious disease outbreaks mandate attention be paid beyond the individual to the community and group.

The communication technologies relied on during crises has begun to change, although legacy media continues to be vital [17], yet protective action behaviors or evacuation orders are not always adhered to. It is not enough to provide potentially affected individuals with information – to perform a behavior or action is more complicated and often depends on perceived risk.

## 2. Risk perception

Risk perception, while often operationalized differently depending on context, has been considered in a number of different disciplines within or adjacent to crisis communication. Scholars have conceptualized risk perception the severity an individual perceives a threat to be, and how susceptible they may be to the threat [35], but others have included feelings of fear, dread, panic, outrage, and uncertainty [20,36,42].

Other research has pursued similar conceptualizations of risk perception. Following Hurricane Katrina's devastation in New Orleans, Louisiana, Lachlan and Spence [15] developed a scale that operationalized risk as perceptions of hazard and outrage. Hazard was conceptualized as the “technical assessment of a risk,” while outrage was related to the “cultural

assessment” or sense-making around an event ([15], p. 110; [16,34]). Although previous work had noted the importance of understanding how serious an individual perceived a threat to be, this research added necessary affective components such as fear, alarm, and anger that were found to increase the likelihood of action [15,16].

In regard to health crises, scholarship dedicated to understanding parental vaccine hesitancy has further found that while individuals are concerned about potential impacts of the disease on their children, they are *more* concerned about the potential effects of the vaccine [4]. This suggests that risk perceptions are more complex than simply understanding what someone fears, and that they may be related, overlap, or contradict each other. Scholars studying perceptions related to a future H5N1 pandemic in Hong Kong, China, found that respondents were generally pessimistic about not only the fatality rate, but also the inadequate government response [20]. The authors noted that given Hong Kong's population's previous experience with infectious disease outbreaks, public health and government officials should also be wary about creating too much public panic in their messaging. Simply put, more messaging about a threat or crisis is not always better.

It is also important to put out that many studies have identified individual differences in perceptions of risk [3,15,39]. In their systematic review, Bish and Michie [3] noted that across twenty-six studies, being older, female, more educated, or non-white, were associated with a higher likelihood of adopting pandemic protective action behaviors. The adoption of behaviors was at least partially explained by perceptions of susceptibility to the disease, perceived severity of the disease, and greater belief in the effectiveness of the protective action (i.e. washing your hands more frequently) [3]. For those communicating to potentially affected individuals during a crisis, modifying messages for different audiences may be a key determinant of success. It also raises concerns about the media on which affected audiences are most reliant.

## 3. Source preference

In such large-scale health crises, individuals must make sense of information that is often time-constrained and highly technical [12,14,26]. Individuals can be expected to collect as much information as they can, provided that they understand the severity of the risk at hand. This information often serves not only to facilitate protective action, but to reduce anxiety and facilitate control over the situation. Of course, people are not born with an innate understanding of pandemics and associated protective actions. According to arguments forwarded in Media Dependency Theory (Defleur & Ball-Rokeach [8]) under conditions in which audiences experience threat or ambiguity they will also likely experience greater dependence on media and sources with which they have had positive experiences in the past, and place more trust in the information received from those sources pertaining to the threat. It is not surprising then, that given the conditions surrounding public health crises, media become an effective tool in engendering appropriate protective responses [23].

Further, it may be the case that news media play a large part in emphasizing the importance of particular events, the seriousness with which they should be taken, and the level of response required by the public. The Agenda Setting function of journalism is well documented in a long history of research concerning the effects of electronic media (see [24,25]). Much of this research indicates that the level of attention given to particular news subjects (such as health risks), in addition to the manner in which they are framed, is likely to lead to predictable audience behavior. Yet, little is known about the specifics of how news dependencies may translate into specific protective actions, and media research to this date has not captured in real time the relationship between source preference and behavioral response to large scale pandemics. To that end, the following research questions are proposed:

**RQ1.** : Does source preference predict risk perceptions?

**RQ2.** : Does source preference predict protective actions?

#### 4. Need for cognition

Of further interest is trait need for cognition, a personality characteristic that has long been tied to central information processing and the capacity to make decisions based on reasoned action [7,30]. Those high in need for cognition have also been shown to rate higher in openness to experience, which makes it seem likely that they would have a need for information related to an impending threat and act upon this information when received, even if this means engaging in non-routine behaviors [27]. However, other research has indicated that those high in need for cognition may be lower in harm avoidance and display high persistence, which would suggest the opposite [10]. There is thus a lack of clarity in the relationship between need for cognition and closely related variables, information seeking, and response during times of crises [37]. While not specifically examined in the context of pandemics and similar health emergencies, it may also be the case that those with high need for cognition are drawn to information-rich content concerning the risk. This begs the question of what specific information sources are connected to need for cognition, and whether need for cognition will drive time spent gathering information from these sources. Thus, the following research questions are proposed:

**RQ3.** : Does need for cognition predict source preference?

**RQ4.** : Does need for cognition predict time spent seeking information?

**RQ5.** : Does need for cognition predict risk perception?

**RQ6.** : Does need for cognition predict protective actions?

#### 5. Methods

Data collection was sponsored by a grant from (agency and grant number redacted for blind review). During the summer of 2020, a survey was distributed to a representative sample of U.S. using the Qualtrics survey panel service. A total of 5019 participants were included and compensated \$2.25 for a fully completed and usable survey. All responses were screened for straight-lining, unusual completion times, and other evidence of poor data. A total of 2435 respondents (48.5%) self-identified as male, 2558 (51.1%) identified as female. Average respondent age was 45.56 ( $SD = 17.81$ ). Caucasians comprised 61.5% of the sample, followed by Latinx (17.1%), African Americans (13.6%), Asians (6.0%), American Indian or Alaska Native (1.1%), Native Hawaiian or Pacific Islander (0.1%), and "other" (0.5%). 18.7% reported making less than \$24,999 per year, 24.4% reported making between \$25,000 and 49,999, 19.4% between \$50,000 and \$74,999, 13.2% between \$75,000 and \$99,999, and 23.7% reported making over \$100,000 annually. Geographic representation included all fifty states, plus Washington, D.C. and Puerto Rico.

##### 5.1. Instrumentation

###### 5.1.1. Need for cognition

The Need for Cognition Scale (Short Form) Cacioppo et al. [6] asks respondents how characteristic a particular behavior is of them, ranging on a five point-scalar from "extremely uncharacteristic" to "extremely characteristic." Example items include "I prefer my life to be filled with puzzles that I must solve," and "I find satisfaction in deliberating hard and for long hours." Confirmatory factor analysis supported the hypothesized unidimensional model,  $CFI = 0.94$ ,  $RMSEA = 0.07$ ,  $\alpha = 0.84$ .

###### 5.1.2. Time spent seeking information

Items estimating total weekly media use across all platforms were adopted from Sherry, Lucas, Greenberg, & Lachlan (2006). Participants

were asked to estimate their time spent seeking information on the pandemic, on a typical weekday, Saturday, and Sunday. This was summed into an estimate of hours per week [(weekday\*5) + Saturday + Sunday]. The mean number of weekly hours spent seeking information about the pandemic was 42.88 ( $SD = 44.59$ ).

###### 5.1.3. Media dependencies

A series of five items interrogated preferred sources for information concerning the pandemic and were adapted from a previous study by the PI [44]. The relative importance of radio, television, the internet, interpersonal interactions, and social media were evaluated on a three point scale with responses of "very important," somewhat important," and "not important."

###### 5.1.4. General risk perception

In order to measure general risk perception, participants completed the Event Hazard-Outrage Scale (EHOS; [16]). This is 32-item scale measures both perceptions of the generalized risk posed by a given hazard and negative affect associated with these risk perceptions. Confirmatory Factor Analysis supported a two-factor (risk perceptions and negative affect)  $CFI = 0.91$ ,  $RMSEA = 0.09$ . Only the hazard factor was retained for the current analysis ( $\alpha = 0.91$ ).

###### 5.1.5. Probability estimation

Three single-item indicators adapted from previous research assessed perceptions of the probability of COVID19 and resultant consequences for those infected (see [45]). Participants estimated the percentage of the U.S. population that will become infected ( $M = 48.47$ ,  $SD = 26.50$ ), the percentage of those infected that will develop a serious illness ( $M = 37.39$ ,  $SD = 26.56$ ), and the percentage of those infected that will die as a result ( $M = 30.80$ ,  $SD = 28.46$ ).

###### 5.1.6. Protective action

Participants responded to a series of yes/no questions concerning recommended protective actions against COVID [46], including cleaning and disinfecting a home more frequently, covering one's mouth when sneezing or coughing, staying home from work or school, keeping a distance of six feet from others, avoiding touching one's face, using hand sanitizer, and washing hands more regularly. Affirmative responses were combined to produce a summative measure of protective actions, ( $M = 6.11$ ,  $SD = 1.36$ ).

###### 5.1.7. Demographics

Participants were asked a series of demographic questions. For purposes of analysis and ease of interpretation, self-reported sex was recoded into -1 for male and 1 for female, while ethnicity was similarly recoded into white (-1) and non-white (1).

#### 6. Results

Hierarchical regression and one-way ANOVA analyses were used to explore the proposed research questions. For research questions one and two, oneway ANOVA analyses examined the mean differences for each of the outcome variables across different levels of reliance on media. Regression was used to examine research questions three through six, with demographic indicators were entered on the first block, followed by the second block containing the demographic indicators plus the composite measure of need for cognition. Given the sample size, a priori power analyses conducted using G\*Power [47] revealed statistical power well over  $1-\beta = 0.99$  for all analyses; as a safeguard against Type 1 errors, only results accounting for at least 2% of the variance are reported as evidence supporting the tested relationships.

### 6.1. Differences across source preference

A series of oneway ANOVA analyses then went on to examine the differences in risk perceptions and protective actions across different levels of perceived importance for each medium (see Table 1). For radio, significant differences across group were detected for perceived likelihood of infection,  $F(2, 5002) = 77.76, p < .001, \eta^2 = 0.03$ ; likelihood of those infected developing a serious illness,  $F(2, 4986) = 222.22, p < .001, \eta^2 = 0.08$ ; and likelihood of those infected dying,  $F(2, 4987) = 306.28, p < .001, \eta^2 = 0.11$ . The pattern of means suggests that those more reliant on radio were reporting higher probability estimates of negative consequences, but not necessarily general risk perception or mitigation behaviors.

A similar pattern is detected for reliance on interactions with others and reliance on social media. For social media, significant differences across group were detected for perceived likelihood of infection,  $F(2, 5002) = 118.26, p < .001, \eta^2 = 0.05$ ; likelihood of those infected developing a serious illness,  $F(2, 4986) = 277.69, p < .001, \eta^2 = 0.10$ ; and likelihood of those infected dying,  $F(2, 4787) = 351.20, p < .001, \eta^2 = 0.12$ . For reliance on others, significant differences emerged likelihood of infection,  $F(2, 5002) = 71.55, p < .001, \eta^2 = 0.03$ ; likelihood of those infected developing a serious illness,  $F(2, 4986) = 173.23, p < .001, \eta^2 = 0.06$ ; likelihood of those infected dying,  $F(2, 4987) = 223.21, p < .001, \eta^2 = 0.08$ ; higher estimates of general risk posed by COVID,  $F(2, 5015) = 68.92, p < .001, \eta^2 = 0.03$ ; and mitigation behaviors,  $F(2, 4812) = 61.86, p < .001, \eta^2 = 0.03$ .

For television and general internet use, a somewhat different pattern is detected, in which stronger effects are associated with general risk perception and mitigation behaviors, and weaker or non-existent effects with probability estimates. For television, those reporting greater reliance on the medium for information reported higher levels of estimated likelihood of those infected developing a serious illness,  $F(2, 4986) = 54.91, p < .001, \eta^2 = 0.02$ ; likelihood of those infected dying,  $F(2, 4987) = 51.45, p < .001, \eta^2 = 0.02$ ; general risk posed by COVID,  $F(2, 5015) = 165.26, p < .001, \eta^2 = 0.06$ ; and mitigation behaviors,  $F(2, 4812) = 143.57, p < .001, \eta^2 = 0.06$ . For general reliance on the internet, those

**Table 1**

Risk Perceptions and Protective Actions Across Medium (Effect sizes  $\geq 0.02$  in bold).

| Radio                   | Very important | Somewhat important | Not important | $\eta^2$    |
|-------------------------|----------------|--------------------|---------------|-------------|
| % infected              | 55.13 (27.36)  | 47.05 (25.29)      | 43.86 (25.82) | <b>0.03</b> |
| % serious health issue  | 48.07 (28.45)  | 35.98 (25.02)      | 29.10 (22.88) | <b>0.08</b> |
| % dead                  | 43.82 (30.89)  | 29.49 (26.82)      | 20.19 (22.53) | <b>0.11</b> |
| General risk perception | 5.53 (1.24)    | 5.23 (1.13)        | 5.32 (1.08)   | 0.01        |
| Mitigation              | 6.28 (1.30)    | 6.12 (1.35)        | 5.94 (1.39)   | 0.01        |
| Television              |                |                    |               |             |
| % infected              | 49.99 (26.72)  | 46.31 (25.37)      | 42.59 (27.19) | 0.01        |
| % serious health issue  | 40.07 (27.06)  | 33.20 (24.82)      | 28.54 (24.25) | <b>0.02</b> |
| % dead                  | 33.56 (29.20)  | 26.62 (26.41)      | 21.28 (25.92) | <b>0.02</b> |
| General risk perception | 5.55 (1.09)    | 4.98 (1.12)        | 4.84 (1.30)   | <b>0.06</b> |
| Mitigation              | 6.31 (1.15)    | 5.85 (1.48)        | 5.22 (1.90)   | <b>0.06</b> |
| Internet                |                |                    |               |             |
| % infected              | 50.75 (26.49)  | 45.48 (26.01)      | 42.52 (26.53) | 0.01        |
| % serious health issue  | 39.20 (27.09)  | 35.35 (25.56)      | 31.38 (24.89) | 0.01        |
| % dead                  | 32.29 (29.19)  | 29.03 (27.18)      | 26.24 (26.89) | 0.004       |
| General risk perception | 5.54 (1.13)    | 5.12 (1.11)        | 4.77 (1.16)   | 0.05        |
| Mitigation              | 6.29 (1.18)    | 5.93 (1.48)        | 5.34 (1.72)   | <b>0.04</b> |
| Others                  |                |                    |               |             |
| % infected              | 54.85 (26.77)  | 45.52 (25.43)      | 45.09 (26.98) | <b>0.03</b> |
| % serious health issue  | 47.09 (28.28)  | 33.38 (24.33)      | 30.81 (24.42) | <b>0.06</b> |
| % dead                  | 42.42 (31.19)  | 26.22 (25.54)      | 22.26 (24.25) | <b>0.08</b> |
| General risk perception | 5.58 (1.26)    | 5.31 (1.05)        | 5.03 (1.16)   | <b>0.03</b> |
| Mitigation              | 6.34 (1.21)    | 6.10 (1.33)        | 5.69 (1.37)   | <b>0.03</b> |
| Social media            |                |                    |               |             |
| % infected              | 55.78 (26.26)  | 47.93 (25.51)      | 42.07 (25.93) | <b>0.05</b> |
| % serious health issue  | 47.74 (27.47)  | 37.81 (25.44)      | 27.22 (22.06) | <b>0.10</b> |
| % dead                  | 43.42 (30.19)  | 30.66 (26.87)      | 19.01 (22.56) | <b>0.12</b> |
| General risk perception | 5.53 (1.25)    | 5.27 (1.09)        | 5.24 (1.09)   | 0.01        |
| Mitigation              | 6.29 (1.24)    | 6.17 (1.35)        | 5.88 (1.36)   | <b>0.02</b> |

more dependent on websites reported higher estimates of general risk posed by COVID,  $F(2, 5015) = 123.64, p < .001, \eta^2 = 0.05$ ; and mitigation behaviors,  $F(2, 4812) = 102.09, p < .001, \eta^2 = 0.04$ .

### 6.2. The impact of trait need for cognition

The third research question sought to examine whether trait need for cognition would influence source preferences. The results suggest that when controlling for demographic influence, need for cognition does not predict source preference. Only the analysis for general internet use revealed a small but statistically significant relationship. The initial model for the demographic block was found significant,  $F(4, 4987) = 93.35, p < .001, R^2 = 0.07$ ; adding need for cognition significantly improved the model,  $F(1, 4986) = 129.28, p < .001, \Delta R^2 = 0.02, \beta = 0.16$ , as need for cognition was positively associated with general internet reliance. For television, the addition of need for cognition to the original model did not significantly improve model fit,  $F(1, 4986) = 1.10, p = .295$ . For radio, social media, and interpersonal interaction, statistically significant changes statistics were determined, but effect sizes were so low as to be determined irrelevant (all  $\Delta R^2 < 0.007$ ).

To answer research question four, this analytic strategy was repeated for the composite measure of time spent seeking information. The initial predictor block produced  $F(4, 4788) = 153.32, p < .001, R^2 = 0.11$ . The addition of need for cognition to the model significantly improved the model statistically, while only accounting for a paltry amount of variance,  $F(1, 4787) = 16.37, p < .001, \Delta R^2 = 0.003, \beta = 0.06$ . Age significantly and negatively predicted information seeking ( $\beta = -0.32$ ), while non-white respondents reported more information seeking ( $\beta = 0.05$ ).

Research question five was similarly addressed through examining the impact of need for cognition on both the hazard variable and the probability estimations of negative health impacts from COVID. For the general hazard measure, the demographic block significantly predicted risk perception,  $F(4, 4987) = 32.39, p < .001, R^2 = 0.03$ ; the addition of need for cognition on the second step significantly improved the model,  $F(1, 4786) = 106.11, p < .001, \Delta R^2 = 0.07, \beta = 0.27$ . Those higher in need for cognition reported more general risk perception, as did women ( $\beta = 0.13, p < .001$ ) and older respondents ( $\beta = 0.14, p < .001$ ). By contrast, the analyses for specific probability estimation do not suggest a relationship between need for cognition and estimated population impact. For the outcome variable addressing the percentage of the U.S. population that would become infected, a significant final model was detected at  $F(5, 4973) = 66.71, p < .001, R^2 = 0.06$ , though the addition of need for cognition to the first predictor block only produced a model improvement of  $\Delta R^2 = 0.002$ . The addition of need for cognition to the initial block did not significantly improve model fit for estimated percentage of those infected who will develop a serious illness,  $F(1, 4958) = 0.00, n.s.$ , nor for estimated percentage of those infected who will die from COVID,  $F(1, 4959) = 1.56, n.s.$

Finally, this analytic strategy was repeated for the summative item for mitigation behaviors. The initial model was found statistically significant,  $F(4, 4785) = 19.02, p < .001, R^2 = 0.02$ . Once again, the addition of need for cognition significantly improved model fit, but not a relevant amount of variance accounted for,  $F(1, 4784) = 71.23, p < .001, \Delta R^2 = 0.01, \beta = 0.12$ . Women ( $\beta = 0.11, p < .001$ ) and non-white respondents ( $\beta = 0.07, p < .001$ ) also reported more mitigation behaviors.

## 7. Discussion

This study extended previous crisis research to the COVID-19 pandemic in the United States. Results. It suggests that need for cognition did not predict source preferences, mitigation behaviors, or specific risk perceptions, but that those higher in need for cognition did feel an elevated sense of overall risk. Source preferences did impact risk perceptions, such that those more reliant on radio, social media, and interactions with others experienced stronger effects for specific risk probability, but not general risk perceptions or mitigation behaviors. Those with heavy reliance on

television and internet preferences indicated higher levels of general risk perception and protection action behaviors. Given COVID-19's ongoing impact, understanding perceptions of risk and related information and behavior impacts remains of interest.

As has been noted in previous crisis literature, each event has an inherent level of originality that makes it challenging to compare results across case studies – COVID-19 is no exception. While the expected relationships between need for cognition and source preference, protective mitigation, and specific risk estimates were not present, this finding may be related to the very nature of the outbreak itself. Across the need for cognition spectrum, individuals may have been so highly exposed to information about COVID-19 that underlying source preferences were rendered immaterial. Additionally, at a certain point a ceiling effect may have occurred, whereby information acquisition no longer impacted specific risk estimates or the likelihood to mitigate. It may be that the significant positive relationship between need for cognition and general risk perception reflects the overall rising sense of risk experienced by those who continued to consume information which was not reflected in probability estimates.

For individuals who had higher preferences for interpersonal-leaning sources (radio, social media, and interactions with others) the finding that these individuals had elevated risk probability estimates may be related to the emotional impact of these sources. Previous studies [11,29] found that while Twitter served an important role in allowing users to share logistic and factual information during periods of civil unrest (the resignation of Hosni Mubarak and the Tunisian and Egyptian revolutions, respectively) emotional content was also prevalent and desired by users. For users who relied more heavily on these sources, the interactivity and affective content may have driven attention, rumination, or elaboration, thereby increasing specific risk perceptions. This remains an empirical question that should be addressed in future research.

These findings stand in contrast to those for participants who indicated preference for information from television or the internet (broadly defined). This more general messaging with an emphasis on facts and statistics may make it less likely that these participants were exposed to the personal accounts and anecdotes more common on social media or in conversation with others. Overall, the current data supports the idea that where participants were gathering their information did have an impact on their specific risk perceptions (radio, social media, and interactions with others) and general risk perceptions (heavy users of television and the internet).

Finally, the lack of impact on protective action may be due to the simplicity of COVID-19 behaviors. In other words, even those who perceive the COVID-19 as severe or spend hours collecting information, are only able to perform behaviors such as social distancing in public or isolating at home. Source preference may not impact mitigation behaviors because the actions themselves are simple and feasible for almost anyone. The efficacy of wearing a mask is not improved by additional time spent researching or ruminating. Nonetheless, those relying heavily on television reported an average of over one additional protective behaviors compared to those who saw the medium as unimportant (see Table 1). This further begs the question of underlying processes that might be driving differential responses to more and less interactive media.

### 7.1. Theoretical implications

The current study has notable implications from both a theoretical and managerial standpoint. While not specified a priori, one possible explanation for the results may be found in the belief and attitude persistence model, *fuzzy trace theory* [31]. According to this model, proposed by Albarracín, Sunderrajan, Lohmann, Chan, and Jiang [1], “people tend to process gist information – fuzzy representations often activated automatically – instead of the verbatim information – the detailed features – presented in a message” (p. 19). Similar to a dual-process model of message processing, this “gist” then acts as a heuristic, or mental shortcut, and depending on the individual's message processing capabilities, is called to memory quicker than specific details the individual may have to

systematically sift through [1]. As the current results suggest, individuals who received less interpersonal, and more fact-based information through media such as television and internet report a heightened sense of general risk perception and weaker specific risk perception; this may be because they are recalling the gist of the innumerable details they have received. As such, these individuals may be less reliant on these details and instead rely upon how the details made them feel, or their heuristic general sense of the crisis. Alternatively, individuals who are receiving less fact-based and detail-oriented information, such as those who consumed more interpersonal-leaning sources such as radio, social media, and interactions with others, may be relying less on general sentiments and gist and more on how the crisis has impacted individuals whose personal stories are heard more frequently. This may also explain respondents increased risk probability and weaker general risk perception in comparison to those who consumed more facts and details. It is important to note that this theoretical speculation of fuzzy trace theory was not directly tested by this study, and further research should explore the role this theory may play in understanding crisis and risk communication during a pandemic.

### 7.2. Managerial implications

Results from the current study provide two notable implications for crisis and emergency managers. First, they provide insight into the type of information individuals prefer. The connection between interpersonal-leaning source types and perception of risk probability suggests that those consuming this information are empathetic and concerned about how the crisis is impacting others. This is valuable information for those creating crisis and risk messaging. These audiences may be more interested, and may be influenced by, personal stories relating to the pandemic more than those not consuming interpersonal media. While not directly tested, it may be the case that affective or identification processes drive elaboration, which in turn leads individuals reliant on these sources to act.

The results also offer implications for managers creating crisis and risk messaging for television and internet audiences. Content creators must understand that though this audience may be consuming these media for more fact-based content but are primarily retaining only the “gist” of the information, this does not necessarily mean managers should reduce the volume of facts and statistics presented. This detail-oriented information may be the reason these individuals are choosing television and internet media over alternative sources. Instead, knowing that the audience's perceptions will be molded from the general sense of many different sources, crisis communicators should make considerable effort to ensure messages are presented in a transparent, frequent, and redundant fashion to ensure the “gist” audiences fashion from memory is accurate.

Further, results suggesting that protective action is relatively stable across individuals signal success for the crisis and risk messaging that has already been distributed. The report of no significant differences in protective action based on need for cognition or source preference implies that the way these actions have been marketed, and the possibly just the simplicity of the behaviors themselves, has proven to be successful in reaching a broad range of Americans. Crisis and risk managers should use results such as these to support continuing to follow best practices in crisis communication by sharing digestible, effective information.

### 7.3. Limitations & future directions

Three notable limitations of the current study include attrition, reliance on participant memory and self-report data, and the generalizability of results to countries other than the United States. First, the survey provided to respondents took approximately 20 min to complete. While this is considered to be a “short” survey by social science researchers [9], there is still considerable evidence to support that the longer an online survey is, the lower the response rate [41]. Additionally, a major limitation is the study's use of participant memory and self-report data, primarily items asking respondents to estimate time they've spent seeking COVID-19 information. Not only does reliance on participant memory have potential to yield

inaccurate responses, but participants may provide socially desirable answers such as over-reporting time spent seeking information. A final limitation of note is the generalizability of the results. While the use of a nationally representative sample insulates against the generalizable threats posed by convenience samples, it is still only a sample of United States residents. Future research in the area should expand to non-U.S. samples.

As we quickly learned during the COVID-19 outbreak, we still have very much to understand about human behavior during a pandemic. Much of what is known about communication during environmental crisis events stems from the study of natural disaster-type environmental crises and health risk communication. While there is some past literature on crisis communication in pandemic contexts other than COVID-19 (e.g. [2,5,21]), researchers must take this opportunity to glean as much information about audience's needs and perceptions as possible, so that we may be better prepared for the next disease outbreak. Further, future research should go beyond examining differences based on basic demographic information. Doing so may improve understanding of any differences in informational needs, goals, or behaviors in contexts such as expanding research to include international participants, and examining possible moderating variables at the individual level. Finally, future research should continue to value both theoretical and practical implications when conducting research. The better we can understand the limitations of crisis research and expand our knowledge of effective crisis communication, the more likely we are to successfully communicate with those in critical need of information.

## 8. Conclusion

Every contribution to crisis communication knowledge directly benefits not just research and theory, but also the audience for whom the crisis messages were created. Our understanding of what constitutes effective crisis and risk communication is constantly updated, uncovered, and refined. The current study explored how Americans are satisfying their informational needs and the impact these needs could have on their risk perception and behaviors during an ongoing crisis. The more we understand about where we go for information and how this information shapes our perceptions and actions, the more useful and effective our crisis messaging will become.

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