Examining the Influences of COVID-19 Information Avoidance and Uncertainty on Perceived Severity of the Pandemic: Applications from the Health Belief Model and Weick's Model of Organizing

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Abstract

Public health responses to the COVID-19 pandemic have been insufficient at keeping the virus from spreading rapidly and threatening public health around the globe. Not only has society been challenged by biomedical issues of disease contagion, infection, morbidity, and mortality, but has also confronted complex cognitive challenges to making sense of this health threat, especially related to accurately evaluating and responding appropriately to the severity of the pandemic. Perceived severity is an important cognitive factor associated with public willingness to adopt needed prevention, protection, and treatment behaviors for responding to serious health risks, like COVID-19. Information avoidance and uncertainty are important constructs from powerful public health and communication theories, including the health belief model and Weick's model of organizing, that guide this study by describing how information influences responses to health threats. We used survey data collected from 561 college students to clarify the relationships among information avoidance, beliefs about unpredictability, and the perceived severity of COVID-19. We found that higher information avoidance was associated with lower perceived severity, and that this association depended on people's unpredictability beliefs. Specifically, for those who had low assessments about unpredictability, we observed a strong negative association between information avoidance and perceived severity. Among those who had high perceived unpredictability levels, we observed a weak negative association between information avoidance and perceived severity. This study evaluates influences of information avoidance and uncertainty on perceived severity of COVID-19. The findings can help guide strategies for enhancing public response to this pandemic and future health threats.

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Introduction

COVID-19 is an infectious disease caused by the novel Severe Acute Respiratory Syndrome coronavirus 2 (SARS-CoV-2). In March 2020, the World Health Organization (WHO) declared the COVID-19 virus as a global pandemic (World Health Organization, 2020). The severity of COVID-19 symptoms can range from very mild (even no symptom) to severe (even fatal). Perceived severity, a cognitive construct derived from health belief model (HBM) (Becker, 1974; Champion & Skinner, 2008; Rosenstock, 1974), refers to a person's feelings about the seriousness of contracting a disease. As an important component of risk perception, perceived severity influences people's intention and motivation to adopt prevention behaviors (Rosenstock, 1974). Previous literature has also suggested that people who perceived more severe consequences from getting COVID-19 were more likely to engage in protection behaviors

including maintaining social distance, wearing facemasks, using hand sanitizer, washing hands frequently, and receiving the COVID-19 vaccine (Fragkaki et al., 2021; González-Castro et al., 2021; Jadil & Ouzir, 2021; Ranjit et al., 2021; Wong et al., 2020). Thus, it is important for people to correctly understand and estimate the severity of COVID-19.

Actively seeking and understanding key information related to COVID-19, such as disease risks and severity, can help people to make appropriate decisions about preventive behaviors (Okan et al., 2022; Stephens et al., 2020). While people may seek COVID-19 information to obtain knowledge and address their uncertainties, some may choose to avoid such information because it may challenge their beliefs or lead to unpleasant feelings (e.g., fear, stress, and anxiety). Information avoidance is defined as "any behavior intended to prevent or delay the acquisition of available but potentially unwanted information" (Sweeny et al., 2010, p. 341). Previous studies have indicated that people were less likely to engage in protection behaviors against COVID-19 if they avoided receiving relevant health messages (Chen, Li, et al., 2022; Siebenhaar et al., 2020; Song et al., 2021).

Uncertainty has been considered as an initiator and motivator for information-seeking behavior according to communication theories. For example, Weick's model of organizing (WMO) is a powerful theoretical perspective that can be applied to managing complex health situations (Kreps, 2009). The model describes how seeking relevant information through strategic communication interactions enables people to effectively make sense of, respond to, and guide future responses to highly equivocal (uncertain) problems (Weick, 1979). The WMO describes three primary interrelated communication processes (phases of organizing) that are needed to respond effectively to complex information situations that people confront (such as pandemics): 1. The enactment phase, where people engage in relevant communication interactions to gather key information to help them make sense of complex situations; 2. The selection phase, where additional communication interactions are conducted, based upon what was learned during the enactment phase of organizing, to help them determine and evaluate the best available response strategies for responding to complex situations; and 3. The retention phase, where still additional communication interactions are conducted to help them determine and preserve what was learned from the enactment and selection phases of organizing (organizational intelligence) to help guide future responses to similar complex situations (Weick, 1979).

Pandemics cause unpredictable public health problems that challenge effective public responses. Members of the public need access to relevant information about the severity of health threats (during the WMO enactment phase of organizing) to determine the best activities for responding to health threats (during the WMO selection phase of organizing), and also to guide strategies for handling similar pandemic situations in the future (during the WMO retention phase of organizing) (Kreps, 2009; Weick, 1979). Information avoidance blocks access to relevant information needed to respond effectively to the complexities of the COVID-19 pandemic, inevitably leading to increased confusion and serious errors by violating the principle of requisite variety that emphasizes the need to develop smart information-based response strategies that match the complexities of the problems addressed (Kreps, 2009, 2021; Weick, 1979).

Uncertainties are rooted in insufficient knowledge or overloaded information (Brondani et al., 2021; Huang & Yang, 2020). During the pandemic, people have

experienced different levels of uncertainty due to the nature of COVID-19—a completely novel and highly contagious infectious disease. Moreover, messages that contained misinformation and disinformation further compounded the problem of uncertainty. (Misinformation is false information that is created and spread regardless of an intent to harm or deceive, while disinformation is a type of false information that is intended to be deliberately deceptive). During the pandemic, people encountered various messages that included misinformation and disinformation originating from different message sources, including from social media posts, news stories, and politicians, which led to negative feelings (e.g., feeling overwhelmed, confused, upset, and scared) and fostered distrust in news and health care experts (Chen, Ariati, et al., 2022). While people are flooded with a great amount of information regarding COVID-19, scientific knowledge about viral mutations, transmission routes, the effectiveness of COVID-19 vaccination, treatments, and long-term effects have often been limited, especially during the beginning of the pandemic. In addition, uncertainty is one of the important characteristics of risk perception (Huang & Yang, 2020). For example, a survey study conducted in China found that adolescents with higher COVID-19 uncertainty were more likely to overestimate their risk of getting COVID-19 (Q. Li et al., 2021). Previous literature also suggested that uncertainty mediated the impact of other HBM constructs (i.e., perceived susceptibility, perceived effectiveness, and perceived barriers) on whether people engaged in protective behaviors toward COVID-19 (Wu et al., 2021).

Although numerous studies have adopted HBM or other health behavior theories in predicting adherence to COVID-19 protection behaviors reporting central HBM constructs such as perceived benefits, perceived barriers, and self-efficacy are significant predictors of preventive behaviors and intention to receive the vaccine (Mirzaei et al., 2021; Patwary et al., 2021; Rabin & Dutra, 2022; Ranjit et al., 2021; Wong et al., 2021), there is limited published empirical research to examine the underlying mechanism among perceived severity, information avoidance, and uncertainty. As an extension of both HBM and WMO, it is important to understand the intertwined effects of constructs from communication theories (uncertainty and information avoidance) with the construct of HBM (perceived severity). To help fill the gaps within the current literature, the purpose of the present cross-sectional survey study conducted during the beginning of the COVID-19 pandemic was (1) to examine the influence of uncertainty and information avoidance on the perceived severity of COVID-19, respectively; and (2) to test the interaction effect of uncertainty and COVID-19 information avoidance on perceived severity by controlling demographic characteristics. We hypothesized that uncertainty and information would be negatively associated with perceived severity, respectively. In addition, we anticipated a significant interaction relationship between these two cognitive variables.

Methods

Procedures

This current study builds upon a cross-sectional online survey project designed to investigate college students' information-seeking behaviors during the COVID-19 pandemic (Chen, Li, et al., 2022). Recruitment and data collection using Qualtrics were conducted between April and June 2020. Study recruitment flyers were

distributed to randomly selected university system student e-mail addresses by the Oklahoma State University Institute for Research and Information Management using a simple random sampling strategy. The participation criteria included being (a) a student enrolled at Oklahoma State University, (b) 18 years or older, (c) proficient in English, and (d) physically located in the United States. The first 120 participants received a $5 Amazon electronic gift card as an incentive. The larger study was approved by the Oklahoma State University Institutional Review Board. The sample size was 561. Detailed recruitment procedures were reported by Chen, Li et al. (2022).

Measures

Information Avoidance. We examined information avoidance regarding COVID-19 through eight items on a five-point Likert scale from "strongly disagree" to "strongly agree". These items were adapted from previous research (Howell & Shepperd, 2016). Example items included "I feel like I have enough information to know my risk of getting COVID-19," and "I would rather not know about COVID-19." The scores on our COVID-19 information avoidance scale exhibited good internal consistency among our participants (Cronbach's alpha = .859). We calculated the mean score for these eight items and a higher mean score indicated higher levels of information avoidance.

Unpredictability. We assessed participants' unpredictability regarding COVID-19 using four items on a five-point Likert scale from "strongly disagree" to "strongly agree." These items were adapted from a prior study about a measure of cancer unpredictability (Hay et al., 2014). Unpredictability is one dimension underlying the concept of uncertainty, which relates to the inability to predict symptoms and illness outcomes (Kuang & Wilson, 2017). Our unpredictability measure focused on an individual's beliefs in irreducible uncertainty to predict COVID-19 symptoms and related outcomes. Example items included "Anybody can get COVID-19, no matter what they do" and "COVID-19 can strike anyone at any time." The scores on our COVID-19 unpredictability scale exhibited acceptable internal consistency among our participants (Cronbach's alpha = .748). We calculated the mean score for these four items and a higher mean score indicated more beliefs in irreducible uncertainties regarding whether any one person might get COVID-19.

Perceived Severity. We examined participants' perceived severity of getting infected with COVID-19 using five items on a five-point Likert scale from "strongly disagree" to "strongly agree." These items were adapted from a previous study about a measure of illness perception (Moss-Morris et al., 2002). Example items included "If I had COVID-19, it would have major consequences on my life" and "If I had COVID-19, it would have serious financial consequences." The scores on our COVID-19 perceived severity scale exhibited good internal consistency among our participants (Cronbach's alpha = .806). We calculated the mean score for these five items and a higher mean score indicated higher perceived severity of the COVID-19 pandemic.

Sociodemographic Characteristics. Sociodemographic characteristics included age, sex, education level (undergraduate or graduate) and race/ethnicity (white, Hispanic/Latino, black or African American, American Indian or Alaska Native, Asian, and other).

Data Analysis

To examine the relationships between information avoidance, unpredictability, and perceived severity, we first performed two

separate simple linear regression models (without covariates). The dependent variable in both models was perceived severity. The independent variable in the first model was information avoidance, and the independent variable in the second model was unpredictability. We then investigated the interaction effect between information avoidance and unpredictability on perceived severity. To examine this interaction effect, we entered information avoidance and unpredictability as the independent variables, an interaction term between information avoidance and unpredictability, and perceived severity as the dependent variable in the third linear regression model. We also performed multiple linear regressions when adding sociodemographic variables as the covariates (i.e., age, sex, race/ethnicity, and education) into the above three models to further clarify the relationship between information avoidance, unpredictability, and perceived severity relating COVID-19 pandemic. According to a priori analysis via G*Power 3.1. (Faul et al., 2009), a minimum sample size of N = 160 is required to achieve a power of 95% (effect size f = 0.15). Our sample size for this study is 561, which is large enough to provide 95% power to detect a medium effect size with 5 predictors (2 continuous variables and 3 categorical variables). Multicollinearity was measured by variance inflation factor (VIF). We used Stata 16 for data analysis. The significance level was set at $\alpha = 0.05$.

Results

Participants' age ranged from 18 to 65 (M = 24.99, SD = 7.47). Most participants were female (64%), white (67%), undergraduate (64%), and between 18 and 24 years old (61%). Only about 5% of the participants were aged above 40. Detailed descriptive information about survey respondents' sociodemographic characteristics can be found elsewhere (Chen, Li, et al., 2022). The possible score ranges of information avoidance (M = 2.06, SD = 0.73), unpredictability (M = 3.38, SD = 0.89), and perceived severity (M = 3.72, SD = 0.91) were all from 1 to 5.

Unadjusted Models (Without Covariates)

The results of the two simple linear regressions indicated that lower information avoidance was associated with higher perceived severity (b = -0.34, p < .001, Adjusted R^2 = 0.07), and higher unpredictability was associated with higher perceived severity of having COVID-19 (b = 0.09, p = .035, Adjusted R^2 = 0.01). The results of our third model (Adjusted R^2 = 0.09), where we added the interaction term, indicated that information avoidance and unpredictability interacted to predict people's COVID-19 perceived severity (interaction effect b = 0.12, p = .015). Also, in the third model, the main effect of information avoidance on perceived severity remained significant (b = -0.77, p < .001), but the main effect of unpredictability on perceived severity became non-significant (b = -0.16, p = .168).

Adjusted Models (Controlling for Sex, Age, Race/Ethnicity, and Education)

When holding sex, age, race/ethnicity, and education constant, our two multiple linear regressions (Table 1 and Table 2) indicated that higher information avoidance was still associated with lower perceived severity (b = -0.32, p < .001), but unpredictability was non-significant (b = 0.07, p = .119). As shown in Table 3, for the interaction effect, similar to the unadjusted model, the adjusted model also indicated that information avoidance and unpredictability interacted to predict people's COVID-19 perceived severity (interaction effect b = 0.15, p = .003). Regarding multicollinearity, none of

the predictors had a VIF higher than 2.5 which indicated that multicollinearity is not a significant issue in this dataset (James & Hatten, 1995).

Our stratified follow-up test indicated that unpredictability negatively moderated the association between information avoidance and perceived severity (Figure 1). Specifically, among those who had low unpredictability (one standard deviation below the mean), we observed the strongest negative association between information avoidance and perceived severity (b = -0.47, p < .001). Among those who had high unpredictability (one standard deviation above the mean), we observed the weakest negative association between information avoidance and perceived severity (b = -0.21, p = .001). Among those who had average unpredictability (mean), the negative association between information avoidance and perceived severity was in the middle (b = -0.34, p < .001).

Table 1

Perceived Severity, Information Avoidance, and Sociodemographic Characteristics

Predictors	*b*	*SE*	*95% CI*	*p*
Information avoidance	-0.32	0.05	[-0.42, -0.22]	< .001**
Age	0.02	0.01	[0.00, 0.03]	.005*
Sex: female	0.22	0.08	[0.07, 0.37]	.005*
Education: graduate	-0.24	0.09	[-0.41, -0.07]	.006*
Race/ethnicity: Hispanic/Latino	0.33	0.13	[0.07, 0.60]	.013*
African American	0.32	0.15	[0.02, 0.63]	.035*
American Indian or Alaska Native	0.14	0.16	[-0.16, 0.45]	.367
Asian	0.51	0.13	[0.26, 0.76]	< .001**
Other	0.27	0.22	[-0.17, 0.70]	.228
Model Adjusted R^2 = 0.13				

Note. SE = standard error; *CI* = confidence interval; *p < 0.05, **p < 0.001.

Table 2

Perceived Severity, Unpredictability, and Sociodemographic Characteristics

Predictors	*b*	*SE*	*95% CI*	*p*
Unpredictability	0.07	0.04	[-0.02, 0.15]	.119
Age	0.02	0.01	[0.01, 0.03]	.001*
Sex: female	0.26	0.08	[0.11, 0.42]	.001*
Education: graduate	-0.20	0.09	[-0.37, -0.02]	.028*
Race/ethnicity: Hispanic/Latino	0.33	0.14	[0.05, 0.60]	.020*
African American	0.31	0.16	[-0.01, 0.62]	.055
American Indian or Alaska Native	0.16	0.16	[-0.16, 0.47]	.333
Asian	0.53	0.13	[0.23, 0.78]	< .001**
Other	0.17	0.23	[-0.27, 0.62]	.450
Model Adjusted R^2 = 0.07				

Note. SE = standard error; *CI* = confidence interval; *p < 0.05, **p < 0.001.

Table 3

Interaction Effect Between Information Avoidance and Unpredictability on Perceived Severity

Predictors	*b*	*SE*	*95% CI*	*p*
Information avoidance	-0.83	0.18	[-1.18, -0.49]	< .001**
Unpredictability	-0.24	0.11	[-0.47, -0.02]	.034*
Information avoidance X Unpredictability	0.15	0.05	[0.05, 0.24]	.003*
Age	0.02	0.01	[0.01, 0.03]	.003*
Sex: female	0.22	0.08	[0.07, 0.37]	.005*
Education: graduate	-0.25	0.09	[-0.42, -0.08]	.004*
Race/ethnicity: Hispanic/Latino	0.33	0.13	[0.07, 0.59]	.014*
African American	0.32	0.15	[0.02, 0.62]	.035*
American Indian or Alaska Native	0.16	0.15	[-0.15, 0.46]	.310
Asian	0.50	0.13	[0.25, 0.75]	< .001**
Other	0.25	0.22	[-0.18, 0.68]	.250
Model Adjusted $R^2 = 0.15$				

Note. SE = standard error; *CI* = confidence interval; *$p < 0.05$, **$p < 0.001$.

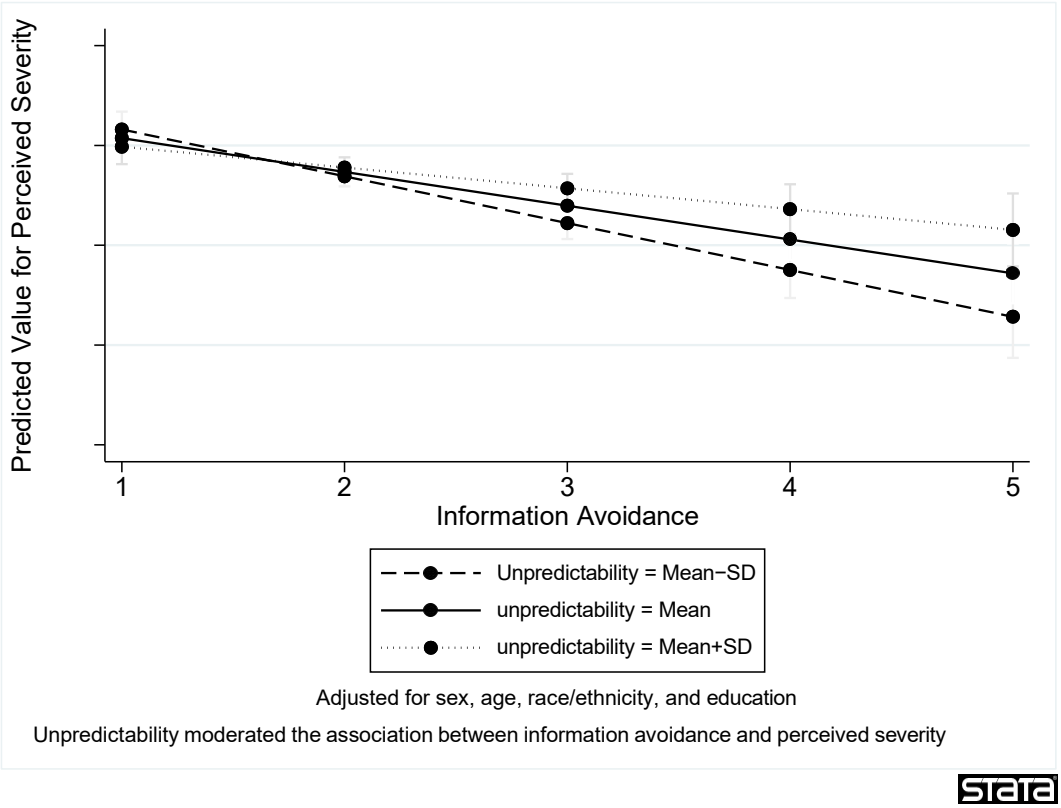

Figure 1. Unpredictability moderated the association between information avoidance and perceived severity.

Discussion

Our results indicate that people who opted not to learn about COVID-19 when given the choice had lower COVID-19 perceived severity. This finding is consistent with a previous study reporting that individuals who were more likely to actively seek out COVID-19 information were those with higher perceived severity (Huang & Yang, 2020). A prior study also found that people with higher COVID-19 information avoidance believed that they had a lower chance of infection (perceived susceptibility), were less worried about becoming infected, and had lower health literacy levels (Chen, Li, et al., 2022). Refusing to actively seek COVID-19 health information leads to minimum acquisition of relevant information about that health topic and a lack of knowledge about the virus (Chen, Li, et al., 2022; Lachlan et al., 2021). Such knowledge deficits might contribute to their underestimated perceived severity. Research shows that individuals with higher information avoidance were less likely to engage in preventive behaviors (Emanuel et al., 2015). People with lower perceived severity (Fragkaki et al., 2021) and lower health literacy (Hong et al., 2021; S. Li et al., 2021; Patil et al., 2021) were also less likely to engage in preventive behaviors against COVID-19. Therefore, there is a critical need to improve knowledge and promote preventive behaviors among individuals with high COVID-19 information avoidance because they tend to have low perceived threat and limited health literacy skills.

Another interesting finding was that people who believe more in irreducible uncertainties regarding whether any one person might get COVID-19 had higher perceived severity. Literature also suggests that uncertainty arises from perceived severity (So, 2013). However, when we hold sex, age, race/ethnicity, and education constant rendered this relationship non-significant. Our results indicate that among university students, being older, being female compared to male, being an undergraduate student compared to graduate student, and being Hispanic/Latino or Asian compared to white were associated with higher perceived severity of COVID-19. Researchers also found that during the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) outbreak in South Korea in 2015, older college students and female students held higher levels of perceived severity compared to younger and male students (Yang & Cho, 2017).

We also found that the degree of negative association between information avoidance and perceived severity depended on people's levels of unpredictability (i.e., beliefs in irreducible uncertainties regarding whether any one person might get COVID-19). We determined that students who had low levels of unpredictability and high levels of information avoidance tended to report low perceived severity, which might lead to poor compliance with COVID-19 public health guidelines. The literature suggests that illness uncertainty may be appraised as either desirable or undesirable. Students with low unpredictability and high information avoidance might see unpredictability as undesirable because unpredictability is closely associated with feelings of anxiety, helplessness, and depression (Lazarus & Folkman, 1984); as a result, they might use information avoidance as a coping strategy to reduce their unpredictability and perceived severity (Kuang & Wilson, 2017).

Limitations

No causal relationship can be drawn from our findings because we used a cross-sectional research design. Due to the dynamic nature of the COVID-19 pandemic, students' knowledge, beliefs, and behaviors may have naturally evolved during the study period.

Future studies can build upon this research by applying a repeated measure design to capture people's change in risk perceptions and information-seeking behaviors during different times of health crises. Also, our findings may not generalize well to a larger population because our participants were recruited from a single university. Future research might build upon this study by examining other populations such as elderly people and people who did not receive college education.

Conclusions

Our study contributes to the literature by clarifying the effects of information avoidance and uncertainty on perceived severity during the COVID-19 pandemic. We conclude that people with higher levels of information avoidance tend to have lower perceived severity, and that this negative association is stronger among people with low uncertainty compared to those with high uncertainty. Our study raises concern that people with higher information avoidance, especially among those with low uncertainty, might underestimate the severity of the virus and thus may be less motivated to perform preventive behaviors against COVID-19.

Implications Health Behavior Theory

The findings from this study suggest that the health belief model (HBM) could be expanded for enlightened preventive health care practice and research by adding other constructs reflecting three stages that a person moves through in assessing serious health threats: threat assessment, action assessment, and outcome assessment (Burns, 1992). Information avoidance and uncertainty are two key components of potential confluence between these three types of assessment. To promote COVID-19 preventive behaviors among those with high information avoidance, researchers and practitioners could develop interventions improving provision of coping resources (e.g., addressing social support and a sense of community belonging) because research shows that people are more likely to avoid information if they perceive limited coping resources (Carver et al., 1989; Sweeny et al., 2010). Further, literature documents that exposure to misinformation related to COVID-19 and low health literacy skills lead to greater information avoidance (Chen, Li, et al., 2022; Kim et al., 2020). Therefore, it is essential to provide health literacy training to enhance people's ability to evaluate the quality of health information and identify COVID-19 misinformation. Also, dis-seminating high-quality COVID-19 information using simple and easy-to-understand language might be another effective strategy to reduce information avoidance among individuals with lower levels of health literacy. Researchers could also clarify the effects of uncertainty on information avoidance in future studies because the associations between uncertainty and information avoidance vary depending on how the uncertainty construct has been conceptualized (Kuang & Wilson, 2017).

The findings from this study also align well with Weick's model of organizing (WMO) by showing how the respondents who avoided seeking COVID-19 health information were likely to misunderstand and respond inappropriately to the severity of the pandemic. This illustrates the failure to accurately interpret the equivocality of the pandemic and to gather relevant health information for guiding their responses to the pandemic, in essence violating the principle of requisite variety (Kreps, 2009, 2021; Weick, 1979). This finding suggests the need to develop and implement interactive and accessible public health communication programs to actively and effectively disseminate the best available actionable

health information about the pandemic to key public audiences. This finding also suggests the need in future research to not only examine health information avoidance and seeking about pandemic severity (during the WMO enactment phase of organizing), but also to study information avoidance and information seeking about the best ways to respond to the pandemic for prevention and protection (during the WMO selection phase of organizing). It would also be important in future research to track how information gathered about the pandemic during the enactment and selection phases of organizing was used to guide planning for future responses to similar pandemics (during the WMO retention phase of organizing). This research highlights the importance of active and effective information seeking during serious pandemics, like the COVID-19 pandemic, to guide the best available organized responses to reduce pandemic contagion, morbidity, and mortality (Kreps, 2021).

In terms of sociodemographic characteristics, on one hand, our findings indicated that health professionals should develop tailored messages about COVID-19 for male, younger, and graduate college students to improve their preventive behaviors through increasing their perceived severity of the pandemic. On the other hand, perceived severity of COVID-19 is positively related to mental health problems among college students (Saleem et al., 2021; Yang & Cho, 2017); therefore, we should also develop and implement interventions to reduce COVID-19 stress and anxiety caused by overestimating perceived severity among female, undergraduate, older (non-traditional), and racial/ethnic minority college students. Future applications of this research program should focus on studying other relevant populations, especially those who are at high risk of contagion, morbidity, and death from the COVID-19 pandemic.

Discussion Questions

1. Health behavior theories can be used alongside many communication theories. Describe how you could use a health behavior theory with another communication theory to promote health?
2. Why is health information so important during complex and serious pandemics, like during the COVID-19 pandemic? Describe how relevant pandemic information could be effectively disseminated to key public audiences?

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