How Media Framing in COVID-19 News Coverage Influences Public Preventive Behaviors

Haoning Zhu

Communication, University of California, Santa Barbara

Abstract

Given most people gain information about COVID-19 from news media, it is important to understand if news framing of COVID-19 can influence people's intentions to take preventive behaviors and their actual behaviors, which may affect public health and many people's life safety. Based on framing and functional emotion theory, this research examined how exposure to differently framed news (threat, positive future, or neutral news) influenced emotional reactions, intentions to take preventive action, and actual subsequent protective behaviors. 196 undergraduates participated in a two-part online experiment. First, they read two COVID-related news stories appropriate to their condition, and then reported their emotional reactions and behavioral intentions. Two days later, they reported their COVID-related protective behaviors. Results indicated that threat news in the frame of fear evoked fear as expected and positive future frames in the frame of hope evoked hope, as expected. Although frames did not directly influence intentions or behaviors, indirect effects were found such that threat frames generated fear, fear influenced behavioral intentions, and intentions predicted behavior 2 days later.

The widespread COVID-19 has significantly affected people's lives and public safety throughout the whole world. Since the outbreak pandemic emerged, a large amount of news has been released, which overwhelmed the public perception. Thus, the news is very important since the way it is formulated and perceived can influence people's responses to the issue, according to the framing theory (Entman, 1993). This study wanted to understand how frames in COVID-19 news influenced people's perceptions of the pandemic and even their health behaviors. Since the functional emotion theory assumes that emotions can serve as frames (Izard, 1993), this research examined how people's emotions elicited by framed news of the pandemic can eventually lead to changes in people's preventive behaviors, which may affect public safety.

Prior research has explored how emotions evoked by message content can work as frames to influence people's information processing, memory, attitudes, and behaviors, as suggested by Nabi's emotion-as-frame model (2003). Regarding health news, topics presented as a threat are likely to evoke fear, while topics presented in terms of new solutions to existing problems are likely to evoke hope (Nabi & Prestin, 2016). Following this model, Nabi and Prestin's study (2016) examined the effects of emotional health news on people's intentions to take protective health actions in the context of human papillomavirus (HPV) prevention.

As COVID-19 has been widespread now and the rate of virus variation is rapid, it is important to understand how people will take protective behaviors for their safety and stop the spread of the coronavirus. In addition, some prior research stated that fear can motivate people to take preventative behaviors effectively (i.e., Breakwell, Fino, & Jaspal, 2021), while other research suggested that feelings of hope and efficacy are amenable to people's protective behaviors (Jørgensen, Bor, & Petersen, 2020). Due to the different findings of prior research, which sometimes even contradict, this research explored the effects of the two main frames of COVID-19 within news coverage – fear framing and hope framing – on people's preventive behaviors.

Literature Review

Tensions between Science and Health News

Lots of research has suggested that a wide range of audiences rely heavily on general mass media news for health information (e.g., Brodie, Kjellson, Hoff, & Parker, 1999; Geana, Kimminau, & Greiner, 2011). However, journalists often use dramatic and emotional styles to present information in order to attract audiences' attention and keep them reading (Shoemaker, 1996), which might be significant for public health and safety (Nabi & Prestin, 2016). For example, the news presented in an emotional style of fear may elicit an audience to unnecessarily worry, leading to decreased mental health (Nabi & Prestin, 2016). On the other hand, the news presented in an over-optimistic style may reduce an audience' motivation to protect themselves from the pandemic (Nabi & Prestin, 2016). Thus, it is essential to decide what an optimal structure of news for public health and safety should be.

Given that U.S. college students are generally reluctant to perform needed preventive behavior, as they don't fear COVID-19, it is important to build a healthy fear regarding the pandemic and help slow the

spread of the virus (Roberts & David, 2021). This is also the study's original intention: understanding how media framing may influence our perceptions and behaviors while being alert to a pandemic that has become a public health hazard.

Framing Theory, News Objectivity, and Framing in COVID-19 News

Framing theory used in the news is fundamental in this research, which assumes that the way information is formulated, or the perspective taken in a message, can influence individuals' responses to the issue at hand (Nabi, 2003). Framing means selecting some aspects of a perceived reality and making them salient over others to promote a particular interpretation and treatment recommendation of an issue (Entman, 1993). For example, if fear-framed news emphasizes the facts of the scary death-toll and continuous limited medical resources instead of the gradually mature medical treatments and upcoming vaccines, which would be otherwise emphasized in hope-framed news. The news makes the negative information salient over the positive one, which may promote people's perception that COVID-19 is horrible and undefeatable. In this way, the news doesn't establish a healthy alert but may cause widespread social panic about the pandemic.

Since journalism's core principle is objectivity, it would be beneficial to understand the concept of framing and identify frames in the news. Journalists may try to report the news without bias and yet convey a dominant framing that prevents audiences from making a balanced assessment of a situation (Entman, 1993). A dominant framing means a problematic, casual, evaluative interpretation with the highest possibility of being noticed and accepted by most people (Entman, 1993). Nowadays, many journalists lack the training to identify frames, so they frequently allow the most skilled media manipulators to present messages within their dominant frames (Entman, 1993). Thus, this research should be helpful for both journalists and the public to understand news framing and have a more fair perception of the pandemic.

According to the content analysis of global media framing of COVID-19 (Ogbodo et al., 2020), fear framing dominated the global media coverage of the pandemic, defined as exaggerating stories to cause fear or panic among the public (Ogbodo et al., 2020). Fear-framed news overhyped the epidemic situations by highlighting threats and triggered people's anxious or distressed moods (Ogbodo et al., 2020). An example of fear-framed news would be: "Matt Hancock, Britain's Health Secretary, said the country wouldn't meet its goal of full ventilator capacity by the peak of the pandemic. The lung ventilators for 18,000 patients may not be in place in time" (Ogbodo et al., 2020, p. 262). This kind of threat news put its audience into fear of losing many lives, which further aggravated the people's fear of the pandemic (Ogbodo et al., 2020). According to Nabi and Prestin's study (2016), information in health news presented in a fear frame is likely to evoke fear. Thus, this research looks to understand if people who read threat news (fear-framed news) would feel significantly more fear than people who read positive future news (hope-framed news) and neutral news, which leads to the first hypothesis:

> **H1:** Threat news will evoke more fear than other news.

On the one hand, hope framing was also frequently used in global news media, which highlighted future opportunities, gave people hope, and reassured them in the midst of the crisis (Ogbodo et al., 2020).

The emotion of hope elicited by news messages was proved as an essential measure that soothed the public and gave them confidence and courage to strive against the pandemic (Ogbodo et al., 2020). An example of the hope-framed news is a *CNN* report that says: "...in all likelihood, hope is not lost. We tend to overestimate the likelihood of something happening, and we tend to underestimate our capacity to deal with it" (Ogbodo et al., 2020, p. 262). This positive future news emphasized opportunities to overcome difficulties during the pandemic, which was expected to give people a sense of hope. In this study, the research looks to see if people who read positive future news feel significantly more hope than people who read threat news and neutral news. Thus, my second hypothesis is:

H2: Positive future news will evoke more hope than other news.

Functional Emotion Theory

Another theory used in the research is functional emotion theory, which supports that emotions facilitate actual behaviors. The premise of this theory is that each emotion serves a unique function in forming perceptions and motivating behavior in a particular way (Izard, 1993). Emotions help mobilize and allocate physical and mental resources given certain interactions between the person and environment (Izard, 1993). In other words, emotion works as a system to respond to environmental inputs, such as social or physical changes, to then produce adaptive behaviors as outputs. The model was applied to this research. The fear and hope frames in the news are the environmental inputs expected to elicit emotions of fear and hope, respectively, and the emotion system would process these inputs and facilitate changes in people's preventive behaviors as adaptive outputs, such as keeping social/physical distance and wearing a mask.

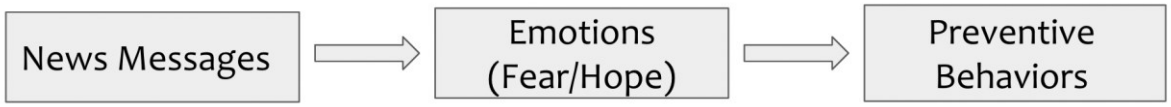


Figure 1. How the Functional Emotion Theory Should Be Theoretically Applied.

A vast amount of previous research has also supported the prediction that fear can influence behavior. According to Rogers's study (1983), fear-framed stimuli seek to eliminate response patterns that harm people's bodies or establish response patterns that might prevent noxious events (i.e., taking preventive actions). In the context of COVID-19, Breakwell et al.'s study (2021) found that people's COVID-19 preventive behaviors are positively correlated with fear, a conclusion that is also supported by Surina et al.'s study (2021) on factors related to COVID-19 preventive behaviors, Olapegba, Chovwen, Ayandele, and Ramos-Vera's study (2021) on the mediating factors in the relationship between fear of COVID-19 and preventive behaviors, and Harper, Satchell, Fido, and Latzman's study (2020) on how functional fear predicts public health compliance. Thus, this study assumes that if threat news generates fear as expected, the emotion of fear would function as a frame, processing the information (input) as a threat to increase people's preventive behaviors (output).

On the other hand, prior research found feelings of hope and feelings of efficacy could contribute to people's protective behaviors (Jørgensen et al., 2020). Nabi and Myrick's study (2019) found that the

significant interaction between hope and self-efficacy predicts behavioral intentions, which can lead to people's actual preventive behaviors. This study assumed that the positive future news would generate hope, and the emotion of hope would work as a frame facilitating people's preventive behaviors. Therefore, this study aims to examine if both threat news and positive future news will increase people's behavioral intentions and preventive behaviors. This leads to the third hypothesis:

> **H3:** Both threat news and positive future news will increase preventive behaviors, compared to the neutral group.

Furthermore, the researcher was also curious about which type of news will have a stronger impact on people's preventive behaviors. Therefore, the first research question is:

> **RQ1:** Which one, threat news or positive future news, will have a stronger impact on preventive behavior?

Also, the study wanted to see how emotions as frames influence the relationship between fear/hope framing and people's preventive behaviors. This makes the second research question:

> **RQ2:** What is the role of felt emotion in the effect of the news on behavior?

Method

Sample

The study recruited 196 undergraduate students at the University of California, Santa Barbara. Some participants (n = 86) were enrolled in Communication courses and invited to participate in the study by their professors. Other participants (n = 110) were recruited from the SONA website, a Communication research pool at UCSB. There was no requirement on their demographic characteristics. All participants received extra course credit as compensation for their participation.

Pilot test

The study did a pilot test with students (n = 12) in COMM 181B class in the Spring 2022 quarter at UCSB. The students were assigned to the three conditions based on the initial of their last name, and each condition had 4 students. The researcher emailed the students drafts of the framed news they should read in each condition, and asked them to respond to the emotional response scale on Qualtrics after reading each piece of the news. The results showed that the responses given by participants who read threat news were concentrated more on measures of the fear index (fearful, nervous, and worried) while the data of the students who read positive future news was more concentrated in columns of the hope index (hopeful, optimistic, and encouraged). Thus, fear and hope framing in the news worked in making their audiences feel fear and hope, respectively.

Procedures

The research was conducted as a two-part online survey experiment on Qualtrics. The links to the surveys were emailed to students from the professors' classes, while other participants accessed the

links via SONA. Before starting the first survey, participants were given a brief description of the study's purpose and told that their identities would remain anonymous. The first survey took approximately 25 minutes to complete; the second survey took approximately 10 minutes.

In the first study, participants reported their ordinary preventive behaviors by completing a revised version of the COVID-19 Preventive Behaviors Index (CPBI) (Breakwell et al., 2021) adapted to my research context before they were exposed to the research manipulations (framed news). Then, Qualtrics randomized participants into three groups. The first group (cond 1, n=63) read threat (fear-framed) COVID-19 news, the second group (cond 2, n=72) read positive future (hope-framed) COVID-19 news, and the control group (cond 3, n=61) read neutral and descriptive COVID-19 news. All participants needed to read two pieces of framed news and stay on the webpage of each piece of news for at least 60 seconds.

After reading each piece of the news, participants needed to respond to the emotional response scale (Nabi, Stitt, Halford, & Finnerty, 2006) to indicate how they felt about the news. Participants also reported their intentions to engage in preventive behaviors after exposure to the framed news. At the end of the first survey, participants' perm numbers were collected to match their data in the second survey, but no other identity information was collected.

Two days later, the participants were asked to complete the second survey measuring their behavioral intentions and frequency of engaging in preventive behaviors in the past two days after reading the framed news. Thus, the study could examine changes in behavioral intentions and actual behaviors between different groups. At the end of the survey, participants' perm numbers were collected to match their data in the first survey. After they completed all the survey questions, a debrief was shown to explain the study design.

Stimuli

The news messages (see Appendix E) exposed to participants were chosen from established media outlets' published news articles. The information was all accurate and not made-up. To frame a news story into either threat news, positive future news, or neutral news, the researcher modified the title, the pictures, and the way information was presented in the news. For example, in the story of the new BA.2 COVID variant, the title of the fear-framed news emphasizes its dominance and worsening of the pandemic; the title of positive future news stressed experienced scientists and mature treatments; the title of the neutral news just objectively described the fact that scientists were monitoring the variant. Although titles emphasize different aspects of BA.2, the information exposed to the three groups was the same in essence but was just presented in different frames.

The first news message about the BA.2 variant was modified from a published ABC News article, "Scientists monitoring new omicron subvariant BA.2." The second news article was about long COVID; in the research framed from a New York Times article, "Can COVID Cause Long Covid?" data from the emotional response scale helped us see if participants from each group felt the expected emotion (e.g., participants reading threat news felt fear), to then know if these different frames worked.

Measures:

Preventive Behaviors

The scale used in this study was adapted from the COVID-19 Preventive Behaviors Index (CPBI) (Breakwell et al., 2021). The original CPBI is a 10-item scale reflecting individuals' major types of preventive behaviors. To adapt the scale to this research context of U.S. college students' preventive behaviors, the researcher kept the major items of CPBI there, like washing hands regularly and avoiding any non-essential travel, but replaced other items that were inappropriate for the research participants to answer with ones that were more applicable to college students. Examples of this change are, "wearing a mask whenever and wherever you can" and "study from home, if possible." The revised version of CPBI includes 7 items; each item is scored on a 7-point scale (1= Never, 7= Always).

Behavioral Intentions

The items used to measure participants' behavioral intentions were the same as in the revised CPBI scale, but the question was changed to "How much will you intend to engage in each of the following behaviors in the coming week?" The scale measuring behavioral intentions included 7 items and each was scored on a 7-point scale (1= None, 7= A great deal).

Emotional Response Scale

The emotional response scale was established based on the one used in Nabi and Prestin's study(2016). After reading each piece of news, the participants were asked how much of 10 emotions they felt while reading the news, on scales from 1 (None) to 7 (A great deal). Of these, three emotions related to fear (fearful, nervous, and worried), three related to hope (hopeful, optimistic, and encouraged), and the other four emotions (relaxed, sad, content, angry) were not related to either fear or hope. Participants' fear and hope were measured by their reporting data on each set of emotions, respectively.

Results

Test of Hypotheses 1&2

Data was analyzed using SPSS (see Appendix A) and a $p < .05$ significance level. Hypothesis 1 predicted that threat news would evoke more fear than other news, which was supported by the results of the Post Hoc Tests in the study. For the first news message about BA.2, participants who read the threat news (cond 1: $M = 4.13$, $SD = 1.32$) felt significantly more fear ($MD_{1-2} = 1.26$; $MD_{1-3} = .50$, $p < .05$) than participants in the other two groups (cond 2: $M = 2.88$, $SD = 1.20$; cond 3: $M = 3.64$, $SD = 1.39$). For the second news message about long COVID, participants who read the threat news (cond 1: $M = 4.33$, $SD = 1.33$) also felt significantly more fear ($MD_{1-2} = 1.41$; $MD_{1-3} = .69$, $p < .05$) than participants in the other two groups (cond 2: $M = 2.92$, $SD = 1.42$; cond 3: $M = 3.64$, $SD = 1.34$).

Hypothesis 2 predicted that positive future news would evoke more hope, which was also supported by the results of the Post Hoc Tests in this study. For the first news message, participants who read the positive future news (cond 2: $M = 4.51$, $SD = 1.40$) felt significantly more hope ($MD_{2-1} = 1.90$; $MD_{2-3} = .33$, $p < .05$) than participants in the other two groups (cond 1: $M = 2.60$, $SD = 1.13$; cond 3: $M = 3.18$, $SD =$

1.25). For the second news message, participants who read the positive future news (cond 2: *M* = 4.18, *SD* = 1.3) also felt significantly more hope ($MD_{2\text{-}1}$ = 1.74; $MD_{2\text{-}3}$ = 1.25, *p <.05*) than participants in the other two groups (cond 1: *M* = 2.44, *SD* = 1.14; cond 3: *M* = 2.93, *SD* = 1.28).

Test of Hypothesis 3

Hypothesis 3 predicted that both threat news and positive future news would increase preventive behaviors, compared to the neutral group. However, this hypothesis was not supported by the results of Post Hoc Pairwise Comparisons because there was no significant difference (see Appendix B) between the three groups in behavioral intentions (MD1-2 = .009, MD1-3 = .039, ns) or in actual behaviors (MD1-2 = .072, MD1-3 = -.193, ns). This means participants who read the threat news or the positive future news neither had more behavioral intentions nor engaged in preventive behaviors more than participants in the neutral news group.

Test for Research Question 1

The first research question asked if the threat news or positive future news would have a stronger impact on people's preventive behaviors. However, regarding control of initial behaviors, the results indicated that there was no direct relationship between the threat message condition and behavioral intentions (*p* = .55), and there was also no direct relationship between the positive future message condition and preventive behavior (*p* = .47).

Test for Research Question 2

The second research question asked what the role of felt emotion was in the effect of the news on behavior. Given that initial behaviors were controlled, there was a significant indirect effect of the threat news condition through fear, such that threat messages generated fear, and fear generated stronger behavioral intentions (Effect = .13, SE = .06, LLCI = .019, ULCI = .259). However, the significant mediation of fear on intentions did not replicate with later behaviors (*p* = .13), which means fear didn't mediate the effect of threat messages on preventive behaviors.

Given that behavioral intentions predict actual behaviors, the PROCESS model found a serial mediation, suggesting that the threat message increased fear, fear increased behavioral intentions, and intentions increased people's preventive behaviors two days later (Effect = .08, SE = .04, LLCI = .012, ULCI = .175). The test controlled initial behaviors. Thus, threat news could influence behaviors by generating people's fear and intentions to then have them engage in preventive behaviors.

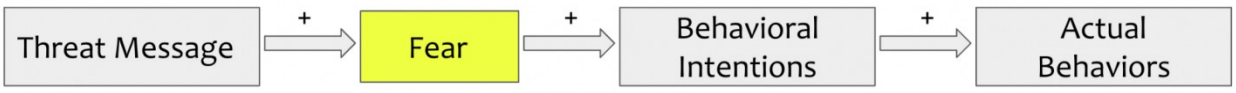


Figure 2. The Serial Mediation of FEAR and Behavioral Intentions on Actual Behaviors.

Discussion

This study aimed to expand our knowledge of how media framing in COVID-19 news coverage influences people's preventive behaviors. Hypothesis 1 was supported, predicting that threat news will evoke more fear than other news, demonstrating that fear-framing of the news worked and made people feel fearful of the pandemic. However, the fear and anxiety propagated via media was found to have a chance in causing a rise in the number of panic attacks, thus harming people's mental health, according to the BBC's prior report (Ogbodo et al., 2020). Many people felt ill after the coronavirus chat, and one source said, ''if there wasn't a hype about the virus looming, I definitely wouldn't be as worried about these symptoms" (Harris, 2020). However, given these problems, the public should still know the latest news concerning the pandemic, which relates to everyone's health. Thus, journalists should be aware of the fear frames in news reporting, using it wisely and avoiding unnecessary public panic. When there is a high rise in the number of people feeling anxious and depressed because of the threat news, journalists can present the COVID information in a more neutral frame, describing facts with objective language, to avoid worsening the public's mental well-being. People who feel overwhelmed by the threat news could intentionally limit their exposure to fear-framed information to reduce their anxieties and worries.

Hypothesis 2 assumes that positive future news would evoke more hope than other news, which was also supported in this research. This means hope framing in the news worked and made its audience feel hopeful about getting through the pandemic, as expected. During the Haitian earthquake, Muralidharan, Rasmussen, Patterson, and Shin's study (2011) reported that the media coverage which emphasized hope in the devastating situation minimized the effects of the earthquakes on the people. In the context of COVID-19, prior research found that hope is an essential countermeasure which soothes the public even in a clearly overwhelming situation like the pandemic (Ogbodo et al., 2020). Thus, journalists should be aware that hope-framed news may be able to cheer people up, minimize their pandemic trauma, and give them the confidence to strive against the worst of the epidemic. On the other hand, the public can seek positive future messages when they need to boost their confidence and self-efficacy to get through difficult pandemic periods.

Hypothesis 3 assumed that compared to the neutral news group, both threat news and positive future news would increase preventive behaviors, which was not supported in the research. There was no significant difference in behavioral intentions or actual behaviors between the three groups. This means people who read framed news neither had more behavioral intentions nor engaged in preventive behaviors more often than those who read the neutral news. Thus, even if a news audience watches fear-framed news or hope-framed news on a long-term basis, their intentions to engage in preventive behaviors and their actual behaviors may not differ from those who always watch neutral news. This could be a product of this group controlling their initial behaviors before being exposed to the news.

Research question 1 examined if threat news or positive future news had a stronger impact on people's preventive behaviors. However, there was no direct relationship between both message conditions and preventive behaviors. That means fear and hope framing in the news didn't directly influence participants' preventive behaviors.

However, the result indicated a serial mediation that threat messages generated emotion of fear, fear increased people's behavioral intentions, and intentions led to increased behaviors. Thus, fear-framed news can indirectly influence people's preventive behaviors. Aligning with this finding, Harper et al.'s study (2020) supported that the only predictor of preventive behavior change (e.g., social distancing, improved hand hygiene) was fear of COVID-19. Therefore, journalists and the public should be aware that fear framing in COVID-19 news could generate people's fear and indirectly facilitate their preventive behaviors. When there is another COVID variant outbreak and the public doesn't pay much attention to, or is tired of, taking preventive actions, fear-framed news should be known to both journalists, and viewers alike, as a way of engaging an audience in preventive behaviors for public safety.

On the other hand, the emotion of hope did not mediate the effect of positive future messages on behavioral intentions (Effect = -.10, SE = .09, LLCI = -.287, ULCI = .056), so hope didn't influence actual behaviors as fear did. In other words, although participants in the research felt hope elicited by reading positive future news, the emotion didn't influence their intentions to take preventive actions. Thus, hope framing in COVID-19 news would make people feel promising and capable of getting through the difficult pandemic period, but we may not expect to see changes in people's preventive behaviors.

Limitations and Future Directions

There are several research limitations in this study. First, since the participants only read two short pieces of news, the information might not be as influential as the framed news in real-life situations that people immerse themselves in daily. Second, since participants report their behavior changes only two days after reading the news, they might not have had enough time to perform preventive behaviors. Third, as the sample were undergraduates, the research findings may not be applicable to the public and its cultures. Future research can explore more surrounding these limitations.

Conclusion

This study has offered insights into how media framing of the COVID-19 news influences people's preventive behaviors. The fear and hope frames in the news generated people's emotions of fear and hope, respectively, and the emotion of fear increased people's behavioral intentions, which then generated their actual preventive behaviors to fight against the pandemic. Journalists and news outlets should be aware of these findings to consider how they want to convey the information of COVID news for public goods, and how the audiences may perceive the information, as news stories can directly influence people's emotions and indirectly influence their behaviors. People should also be aware of how news framing works,how it may influence their emotional perceptions, behavioral intentions, and actual behaviors concerning media literacy. In this way, news media can produce high-quality news with careful consideration of its effects on the public, and decide what an optimal structure of news is for public health. Meanwhile, the public could make an effort to be empowered, to establish a healthy awareness of the pandemic, and to be aware of their emotions and behaviors as we address this public health crisis.

References

Breakwell, G. M., Fino, E., & Jaspal, R. (2021). The COVID-19 preventive behaviors index:Development and validation in two samples from the United Kingdom. *Evaluation & the health professions*, *44*(1), 77-86. DOI: 10.1177/0163278720983416

Brodie, M., Kjellson, N., Hoff, T., & Parker, M. (1999). Perceptions of Latinos, African health information source. Howard Journal of Communication, 10, 147–167. doi:10.1080/106461799246799

Entman, R. M. (1993). Framing: Towards clarification of a fractured paradigm. *McQuail's reader in mass communication theory*, 390-397.

Geana, M. V., Kimminau, K. S., & Greiner, K. A. (2011). Sources of health information in a multiethnic, underserved, urban community: Does ethnicity matter? Journal of Health Communication, 16, 583– 594. doi:10.1080/10810730.2011.551992

Harris, B. B. (2020, March 31). *Coronavirus and anxiety: "Following the news made me have a panic attack."* BBC News. https://www.bbc.com/news/newsbeat-52025220

Harper, C. A., Satchell, L. P., Fido, D., & Latzman, R. D. (2020). Functional Fear Predicts Public

Health Compliance in the COVID-19 Pandemic. *International Journal of Mental Health and Addiction*, *19*(5), 1875–1888. https://doi.org/10.1007/s11469-020-00281-5

Izard, C. E. (1993). Organizational and motivational functions of discrete emotions. In M. Lewis & J. M. Haviland (Eds.), *Handbook of emotions* (pp. 631–641). The Guilford Press.

Jørgensen, F. J., Bor, A., & Petersen, M. B. (2020). Compliance without fear: Predictors of protective behavior during the first wave of the COVID-19 pandemic. *PsyArXiv. May*, *19*.

Muralidharan, S., Rasmussen, L., Patterson, D., & Shin, J. H. (2011). Hope for Haiti: An analysis of Facebook and Twitter usage during the earthquake relief efforts. *Public relations review*, *37*(2), 175-177.

Nabi, R. L. (2003). Exploring the framing effects of emotion: Do discrete emotions differentially influence information accessibility, information seeking, and policy preference?. *Communication Research*, *30*(2), 224-247. https://doi.org/10.1177/0093650202250881

Nabi, R. L., & Myrick, J. G. (2019). Uplifting fear appeals: Considering the role of hope in fear-based persuasive messages. *Health communication*, *34*(4), 463-474.

Nabi, R. L., & Prestin, A. (2016). Unrealistic hope and unnecessary fear: Exploring how sensationalistic news stories influence health behavior motivation. *Health Communication*, *31*(9), 1115-1126. https://doi.org/10.1080/10410236.2015.1045237

Nabi, R. L., Stitt, C., Halford, J., & Finnerty, K. (2006). Emotional and Cognitive Predictors of the Enjoyment of Reality-Based and Fictional Television Programming: An Elaboration of the Uses and Gratifications Perspective. Media Psychology, 8, 421–447. doi:10.1207/ s1532785xmep0804_5

Olapegba, P. O., Chovwen, C. O., Ayandele, O., & Ramos-Vera, C. (2021). Fear of COVID-19 and preventive health behavior: Mediating role of post-traumatic stress symptomology and psychological distress. *International journal of mental health and addiction*, 1-12.

Ogbodo, J. N., Onwe, E. C., Chukwu, J., Nwasum, C. J., Nwakpu, E. S., Nwankwo, S. U.,

Nwamini, S., Elem, S., & Iroabuchi Ogbaeja, N. (2020). Communicating health crisis: a content analysis of global media framing of COVID-19. *Health Promotion Perspectives*, *10*(3), 257–269. https://doi.org/10.34172/hpp.2020.40

Roberts, J. A., & David, M. E. (2021). Improving Predictions of COVID-19 Preventive Behavior: Development of a Sequential Mediation Model. *Journal of Medical Internet Research*, *23*(3), e23218. doi: 10.2196/23218.

Rogers, R. W. (1983). Cognitive and psychological processes in fear appeals and attitude change: A revised theory of protection motivation. *Social psychophysiology: A sourcebook*, 153-176.

Šuriņa, S., Martinsone, K., Perepjolkina, V., Kolesnikova, J., Vainik, U., Ruža, A., ... & Rancans, E. (2021). Factors related to COVID-19 preventive behaviors: a structural equation model. *Frontiers in Psychology*, *12*.

Shoemaker, P. J. (1996). Hardwired for news: Using biological and cultural evolution to explain the surveillance function. Journal of Communication, 46(3), 32–47. doi:10.1111/j.1460-2466.1996.tb01487.x

Appendix A. Tables and Figure of Hypothesis 1 and 2

Table 1

Descriptive Statistics of Fear of the Three Conditions

	Cond	M	SD	N
Message 1 Fear	1.00	4.13	1.32	63
	2.00	2.88	1.20	72
	3.00	3.64	1.39	61
	Total	3.51	1.40	196
Message 2 Fear	1.00	4.33	1.33	63
	2.00	2.92	1.42	72
	3.00	3.64	1.34	61
	Total	3.60	1.48	196

Table 2

Multiple Comparisons of Fear between the Three Conditions

Dependent Variable	Cond (I)	Cond(J)	Mean Difference (I-J)	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Message 1 Fear	1.00	2.00	1.26*	.000	.82	1.70
		3.00	.49*	.036	.03	.95
	2.00	1.00	-1.26*	.000	-1.70	-.82
		3.00	-.76*	.001	-1.21	-.32
	3.00	1.00	-.49*	.036	-.95	-.03
		2.00	.76*	.001	.32	1.21
Message 2 Fear	1.00	2.00	1.41*	.000	.94	1.87
		3.00	.69*	.006	.20	1.17
	2.00	1.00	-1.41*	.000	-1.87	-.94
		3.00	-.72*	.003	-1.19	-.25
	3.00	1.00	-.69*	.006	-1.17	-.20
		2.00	.72*	.003	.25	1.19

* The mean difference is significant at the .05 level.

Table 3

Descriptive Statistics of Hope of the Three Conditions

	Cond	M	SD	N
Message 1 Hope	1.00	2.60	1.13	63
	2.00	4.51	1.40	72
	3.00	3.18	1.25	61
	Total	3.48	1.51	196
Message 2 Hope	1.00	2.44	1.14	63
	2.00	4.18	1.36	72
	3.00	2.93	1.28	61
	Total	3.23	1.46	196

Table 4

Multiple Comparisons of Hope between the Three Conditions

Dependent Variable	Cond (I)	Cond(J)	Mean Difference (I-J)	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Message 1 Hope	1.00	2.00	-1.91*	.000	-2.34	-1.47
		3.00	-.58*	.012	-1.03	-.13
	2.00	1.00	1.91*	.000	1.47	2.34
		3.00	1.33*	.000	.89	1.77
	3.00	1.00	.58*	.012	.13	1.03
		2.00	-1.33*	.000	-1.77	-.89
Message 2 Hope	1.00	2.00	-1.74*	.000	-2.17	-1.31
		3.00	-.49*	.032	-.94	-.04
	2.00	1.00	1.74*	.000	1.31	2.17
		3.00	1.25*	.000	.81	1.68
	3.00	1.00	.49*	.032	.04	.94
		2.00	-1.25*	.000	-1.68	-.81

* The mean difference is significant at the .05 level.

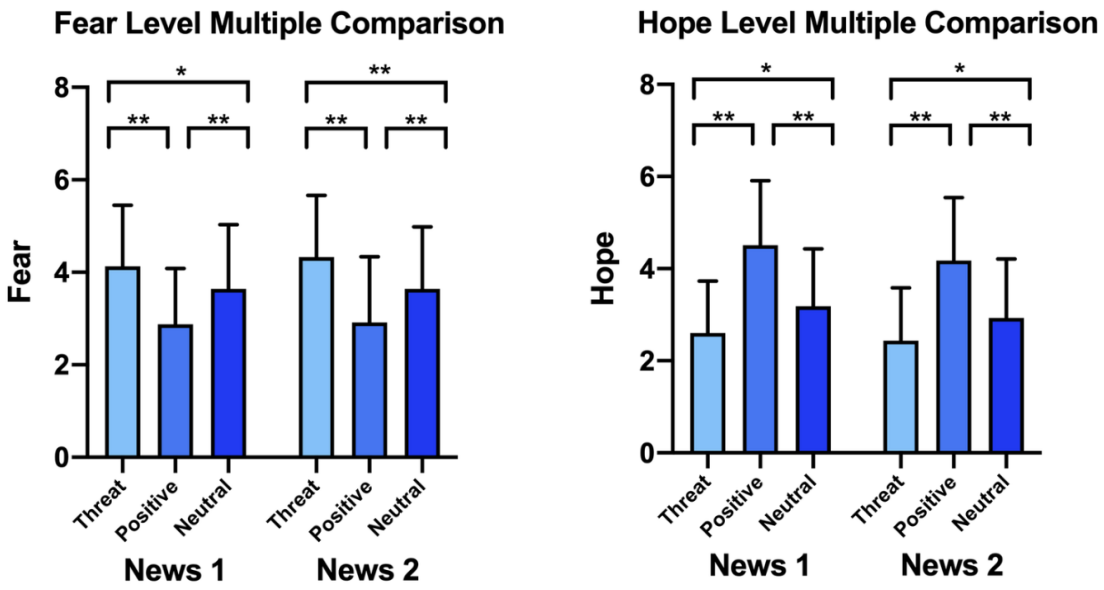


Figure 3. Fear & Hope Level Comparisons between the Three Conditions.

Appendix B. Tables and Figure of Hypothesis 3

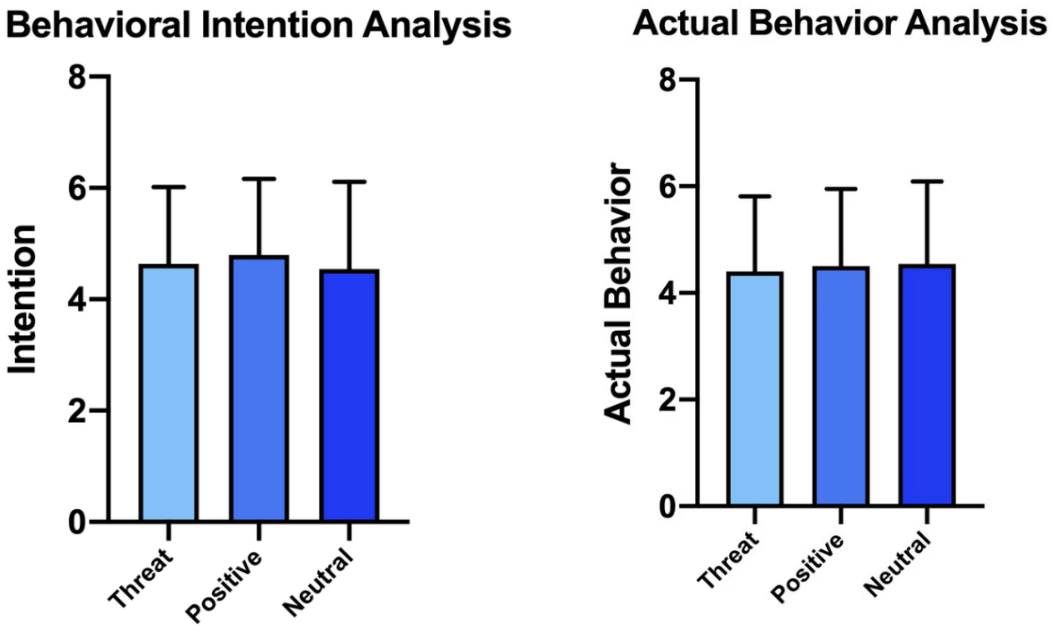


Figure 4. Behavioral Intentions & Actual Behaviors Analysis between the Three Conditions.

Table 5

Comparisons of Behavioral Intentions between Three Groups

(I) Cond	(J) Cond	Mean Difference (I–J)	Sig.	95% Confidence Interval for Difference	
				Lower Bound	Upper Bound
1.00	2.00	.009	.95	-.28	.30
	3.00	.039	.80	-.26	.34
2.00	1.00	-.009	.95	-.30	.28
	2.00	.030	.84	-.26	.32
3.00	1.00	-.039	.80	-.34	.26
	2.00	-.030	.84	-.32	.26

Table 6

Comparisons of Actual Behaviors between Three Groups

(I) Cond	(J) Cond	Mean Difference (I–J)	Sig.	95% Confidence Interval for Difference	
				Lower Bound	Upper Bound
1.00	2.00	.072	.66	-.25	.39
	3.00	-.193	.26	-.53	.14
2.00	1.00	-.072	.66	-.39	.25
	2.00	-.265	.11	-.59	.06
3.00	1.00	.193	.26	-.14	.53
	2.00	.265	.11	-.06	.59

Appendix C. Consent Form

Assessment of COVID Related News

Purpose: You are being asked to participate in a research study. The purpose of the study is to explore how media framing in COVID-19 news influence audiences' behaviors and self-efficacy.

Procedures: If you decide to participate, you will be asked to first answer some questions and respond to scales about COVID. Then you should read two pieces of COVID news very carefully,

and then respond to the following scales and questions. Two days later, you will be asked to complete another survey, which is the second part of the study. This is a two-part online study, and the estimated time commitment is 60 minutes in total. The estimated number of subjects is 240.

Benefits: You will receive 0.5 SONA credit if you complete the first part of the study, and receive another 0.5 SONA credit if you complete the second part of the study. In total, you will be granted 1 SONA credit if you complete the whole research process.

Risks: There are no anticipated risks to participating in this project apart from potential psychological discomfort because of thinking about current news events. You will get more information about the design of the study once you complete the whole research process.

Confidentiality: The data collected as part of this project may not be used for future research purposes. The researcher will only collect your perm numbers in the two surveys to match your data. After matching the data, the collected perm number will be destroyed, so there will be nothing to do with identifying who you are throughout the research process.

Right to Refuse or Withdraw: You can refuse to take part in this project and you can stop participating at any time. You can skip questions or refuse to complete any items in the questionnaire. You have the right to receive a copy of this consent form.

Contact Information: If you have questions about the research, you can call me at 805-284-8349 or email me haoning@ucsb.edu. If you have any questions regarding your rights as a research subject, please contact the Human Subjects Committee at (805) 893-3807 or hsc@research.ucsb.edu. Or write to the University of California, Human Subjects Committee, Office of Research, Santa Barbara, CA 93106-2050.

Do you consent to participate in the study?

- o Yes.
- o No, please send me to the end of the study.

Appendix D. Measures

Q1. (Preventive Behaviors) How likely are you to engage in each of the following behaviors to protect yourself from COVID-19?/ In the past two days, how frequently have you engaged in each of the following behaviors?

	Never (1)	2	3	4	5	6	Always (7)
Use a facemask whenever and wherever you can.	O	O	O	O	O	O	O
Study from home, if possible.	O	O	O	O	O	O	O
Avoid any non-essential travel.	O	O	O	O	O	O	O
Wash your hands regularly.	O	O	O	O	O	O	O
Keep informed about COVID-19 by watching the news and other credible information sources.	O	O	O	O	O	O	O
Avoid unnecessary crowded places (parties, etc.).	O	O	O	O	O	O	O

Keep social distance in your every day interactions with people outside of your household.	O	O	O	O	O	O	O

Q2. (Emotional Response Scale) How much of each of the following emotions below did you feel while reading the news story?

	None (1)	(2)	(3)	(4)	(5)	(6)	A great deal (7)
Worry	O	O	O	O	O	O	O
Optimistic	O	O	O	O	O	O	O
Fearful	O	O	O	O	O	O	O
Encouraged	O	O	O	O	O	O	O
Relaxed	O	O	O	O	O	O	O
Hopeful	O	O	O	O	O	O	O

Sad	O	O	O	O	O	O	O
Content	O	O	O	O	O	O	O
Nervous	O	O	O	O	O	O	O
Angry	O	O	O	O	O	O	O

Q3. (Behavioral Intentions) How much do you intend to engage in each of the following behaviors in the coming week?

	Never (1)	2	3	4	5	6	Always (7)
Use a facemask whenever and wherever you can.	O	O	O	O	O	O	O
Study from home, if possible.	O	O	O	O	O	O	O
Avoid any non-essential travel.	O	O	O	O	O	O	O

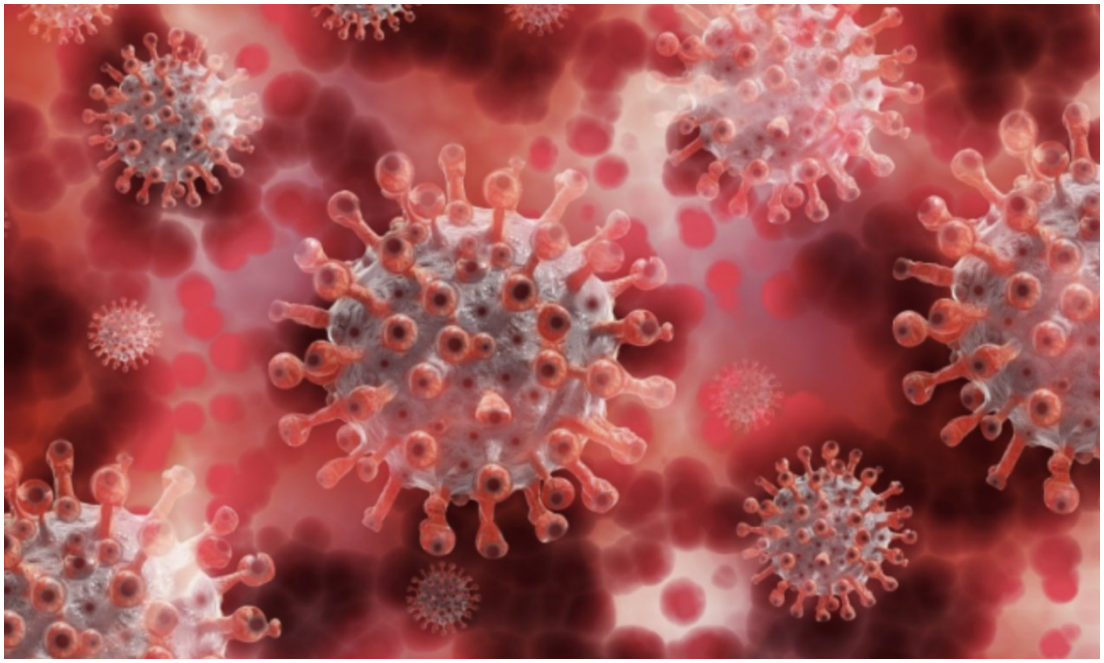
Wash your hands regularly.	O	O	O	O	O	O	O
Keep informed about COVID-19 by watching the news and other credible information sources.	O	O	O	O	O	O	O
Avoid unnecessary crowded places (parties, etc.).	O	O	O	O	O	O	O
Keep social distance in your every day interactions with people outside of your household.	O	O	O	O	O	O	O

Appendix E. Framed News

Threat News, Message 1

News Omicron BA.2 Is Now the Dominant Coronavirus Variant in the U.S., CDC Says

The next wave of COVID-19 is coming, and in some parts of the United States, it’s already here. Are you ready?



A simple virus has brought life as we know it to a screeching halt.

By Dr. Nitya Rajeshuni

April 16, 2022, 6:28 pm

Even as the highly contagious omicron COVID-19 variant continues its rapid spread, a new coronavirus variant, BA.2, first detected two months ago, is making its way across the U.S. and spreading more quickly in the Northeast and West. The BA.2 variant is 1.5 times more transmissible than the original omicron strain.

Nobody knows for sure how much havoc it will cause, but BA.2 has already led to a surge of cases in Europe and is now the dominant version of the coronavirus in the United States and around the world. Its cases have roughly doubled each week for the past month in LA County, and BA.2 accounts for over half of new U.S. coronavirus cases.

BA.2 is dubbed the "stealth variant" because it isn't as easy to detect as BA.1 and has a different genetic sequence from BA.1. The World Health Organization, which tracks variants, called BA.2 “a variant of concern.”

Given the dramatic increase in confirmed cases of BA.2, health care organizations, like the WHO, are asking scientists to watch and study the new subvariant separately from Omicron, to see how it behaves.

“It is the nature of viruses to evolve and mutate, so it’s to be expected that we will continue to see new variants with faster transmission emerge as the pandemic goes on,” warned Dr. Meera Chand, the COVID-19 incident director at the U.K. Health Security Agency, in prepared remarks. “Based on what we have seen, there is a potential to see another surge.”

Although some scientists argue that BA.2 may not cause another major surge, in part because so many people were infected by the original Omicron wave and at least have some natural or vaccine immunity, other scientists don't think so.

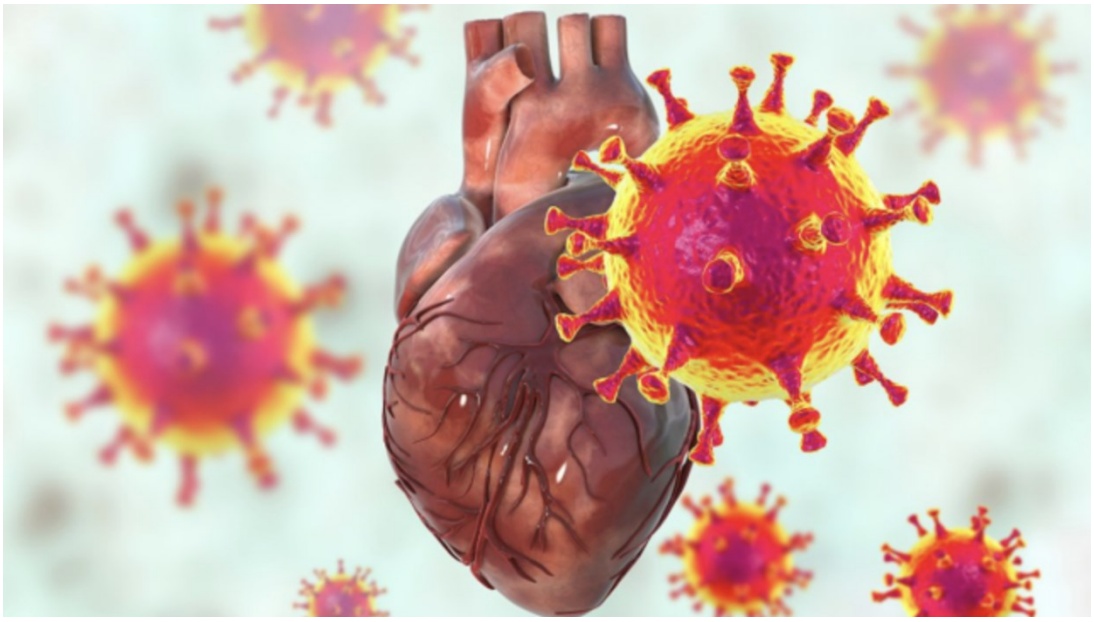
“We are very concerned,” said Dr. Nicksy Gumede-Moeletsi, adding that BA.2 was proving hard to identify because it was not always picked up by the S-Gene Target Failure criterion, which is used to distinguish the original Omicron from other variants.

Ultimately, scientists and public health officials are urging continued research and surveillance in light of this highly contagious variant. It's anyone's guess how high cases will go, whether lots of people will need hospital care, and whether the nation will continue to see breathtaking numbers of deaths.

Threat News, Message 2

News Omicron Is Highly Transmissible. Are More Cases of Long COVID on the Horizon?

Scientists say mild initial illness does not signal reduced risk.



Scientists are worried that Omicron can cause severe symptoms, including heart palpitations and shortness of breath.

By Pam Belluck

April 17, 2022, 5:48 pm

Many public health officials believe the Omicron variant causes less severe illness than other versions of the coronavirus. But another important question looms: whether infection with Omicron can result in long COVID. The constellation of physical, neurological and cognitive symptoms that can last for months and impair people's daily lives. Given mild illness with other COVID variants has been associated with long COVID and the vaccine has proven less effective against the Omicron variant, scientists see the reason for concern.

Can Omicron cause long COVID?

Because the Omicron variant was first identified in late November, the long-term effects of the virus won't be known for several months. However, scientists are worried that, like previous versions of the virus, it will lead to the emergence of problems like brain fog or extreme fatigue even after the infection has resolved.

Although recent reports suggest that Omicron may cause less severe initial illness than other variants, the basic symptoms of infection with Omicron are similar to infection with other variants, suggesting that long-term effects are likely to be similarly severe. Milder initial illnesses do not necessarily mean that Omicron is less likely to lead to severe long COVID symptoms, including chest pain, shortness of breath, skin rashes, heart palpitations, and the new onset of diabetes or high blood pressure.

Can vaccines prevent long COVID?

Probably not.

With some previous variants, vaccines seemed to reduce the likelihood of infection itself, but vaccines have not been as effective in preventing infection with Omicron, leading to a relatively high number of breakthrough infections with this new variant.

While some studies showed that vaccines were helpful against long COVID, these were all performed before the emergence of the Delta variant, and the results have been mixed.

Most worrisome are the more recent studies casting doubt on the ability of vaccines to prevent long COVID. The most comprehensive study to date was conducted by researchers in the United Kingdom who analyzed electronic medical records of patients in the United States. It compared about 10,000 people who had received Covid vaccines with a similar number of people who had not been vaccinated against the coronavirus but did have a flu vaccine — an effort to limit the number of people in the study who might be considered vaccine-hesitant or who generally had less healthy behaviors, the researcher said. The study found that having a coronavirus vaccine before being infected did not reduce the risk of most symptoms of long COVID at all.

Positive Future News, Message 1

Researchers Are Ready to Take on the BA.2 Variant

Health experts believe a new wave of infections is unlikely.

A 20-second handwashing can effectively protect you from the virus.

By Dr. Nitya Rajeshuni

April 16, 2022, 6:28 pm

The dominant COVID variant in the U.S. is now BA.2, which was identified two months ago. But scientists are confident in how to deal with it.

According to a global variant tracking database to which cases are reported, 40 countries have identified BA.2, and the subvariant accounts for 54.9 percent of the cases in the U.S. Yet some European countries are now seeing a slower uptick in new cases, or even a decline.

Although BA.2 has become a dominant variant in the U.S. and around the world, American health officials have said they are hopeful that BA.2 won't cause another major surge, in part because so many people were infected by the original Omicron wave this winter and most likely have at least some natural or vaccine immunity to protect them against severe illness and hospitalization.

Scientists are watching and studying the new subvariant separately from omicron, to see if it behaves differently.

In the U.S., the seven-day average of new cases has dropped significantly. The average has hovered this past week at about 30,000 cases per day, a level last seen in July, according to a New York Times database. COVID hospitalizations plummeted in the last two weeks by about 35 percent, to about 18,000 per day. Intensive care unit hospitalizations have fallen, too — by about 42 percent, to under 3,000.

Ultimately, while scientists and public health officials are urging continued research and surveillance, experts say there is a good reason to be optimistic.

"BA.2 is important from a public health perspective," Dr. Brownstein said. "Every day, we are learning more about variants and ways to successfully combat them." In fact, scientists agree that as the virus continues to mutate, it will weaken, thus paving the way toward the end of the pandemic.

Positive Future News, Message 2

News Omicron Causes More Mild Symptoms. Is Long COVID Also Less Likely?

Scientists believe vaccination has some benefits against long-term COVID symptoms.

Vaccines reduce the likelihood of being infected by Omicron, which is the best way to avoid long COVID.

By Pam Belluck

April 17, 2022, 5:48 pm

Many public health officials have taken heart in early evidence that shows infections from the Omicron variant tend to cause mild illness compared to other versions of the coronavirus. But another important question is whether infection with Omicron, including breakthrough cases in vaccinated people, can result in long COVID —symptoms that last for more than 4 weeks.

Omicron and long COVID

Because the Omicron variant was first identified in late November, there is currently little

evidence that omicron can lead to the emergence of problems, like brain fog or extreme fatigue after the infection has resolved. The basic symptoms of infection with Omicron are similar to infection with other variants, though Omicron is more likely to stay in the upper respiratory tract and less likely to affect the lungs. Therefore, although some studies claim confirmed cases of people developing long COVID after Omicron infection, any lingering symptoms should not affect breathing and lung function.

Can vaccines prevent long COVID?

There is a good chance.

Vaccines prevent people from getting seriously ill or dying from a coronavirus infection. With some previous variants, vaccines reduced the likelihood of infection itself — and not being infected is, of course, the best way to avoid long COVID.

One large study, which was published in the journal The Lancet Infectious Diseases, was based on reports to a phone app by more than 1.2 million British adults who had received at least one dose of a coronavirus vaccine between December 2020 and July 2021. Double vaccinations reduced breakthrough infections by 50%. Only about 5 percent of those with breakthrough infections reported lingering symptoms. Another large study, which was published without being peer-reviewed, found a similarly encouraging result. The study, produced by Arcadia, a healthcare data firm, and the COVID Patient Recovery Alliance, a collaboration of leaders with health expertise in government and the private sector, analyzed records of about 240,000 patients infected with the coronavirus by May 2021.

It found that people who had received even one dose of a COVID vaccine before their infection were seven to 10 times less likely to report two or more symptoms of long COVID 12 to 20 weeks later. The study, which was led by Michael Simon, Arcadia's director of data science, and Dr. Richard Parker, the firm's chief medical officer, also found that people who received their first vaccine dose after contracting the coronavirus were less likely to develop long COVID than those who remained unvaccinated, and the sooner they were vaccinated after infection, the lower the risk of long-term symptoms.

Neutral News, Message 1

News Scientists Are Monitoring Omicron Subvariant BA.2

Research is underway to understand the new strain.

Health care workers take swab samples at a COVID-19 drive-through test.

By Dr. Nitya Rajeshuni

April 16, 2022, 6:28 pm

A subvariant of the Omicron strain of COVID, known as BA.2, is now the predominant strain in new cases identified in countries around the world with at least 40 countries reporting cases to a global variant tracking database. BA.2 now accounts for about 55 percent of new U.S. cases.

It is unclear where BA.2 originated. Even though the first sequences were submitted from the Philippines, numerous cases have since been detected in various places, from Europe to South Asia. The World Health Organization, which tracks variants, called BA.2 “a variant of concern.” But in the U.S., the seven-day average of new cases has actually dropped and the hospitalization rate decreased.

Health care organizations, like the WHO, are asking scientists to watch and study the new subvariant separately from Omicron, to see if it behaves differently.

"It is the nature of viruses to evolve and mutate, so it's to be expected that we will continue to see new variants emerge as the pandemic goes on," said Dr. Meera Chand, the COVID-19 incident director at the U.K. Health Security Agency, in prepared remarks. "So far, there is insufficient evidence to determine whether BA.2 causes more severe illness than Omicron BA.1, but data is limited."

Ultimately, while scientists and public health officials are urging continued research and surveillance, experts say there is little reason to worry.

"BA.2 is important from a public health perspective," Brownstein said. "A lot more work needs to be done to understand severity, breakthrough infections, and immunizations before you can make any statement about clinical relevance."

Neutral News, Message 2

News Can Omicron Cause Long COVID?

Scientists are tracking if mild initial illness signals reduced risk.

Studies are examining if vaccines can prevent vaccinated people who have breakthrough infections from developing long COVID.

By Pam Belluck

April 17, 2022, 5:48 pm

Many public health officials have taken heart in early evidence that suggests infections from the Omicron variant tend to cause less severe illness than other versions of the coronavirus. But another important question remains: whether infection with Omicron, including breakthrough cases in vaccinated people, can result in long COVID — the constellation of physical, neurological and cognitive symptoms that can last for months and impair people's daily lives.

It is too early for scientists to know much about the relationship between Omicron, vaccination and long COVID. Research from earlier in the pandemic does not yield definitive clues. Here is a sketch of what scientists have learned and the many questions still to be answered.

Can Omicron cause long COVID?

Because the Omicron variant was first identified in late November, it is too early to say how long symptoms of infection can persist. It is also unclear whether, like previous versions of the virus, it can lead to the emergence of problems like brain fog or extreme fatigue after the infection has resolved.

Although recent reports suggest that Omicron may cause less severe initial illness than other variants, the basic symptoms of infection with Omicron are similar to infection with other variants, suggesting that long-term effects could also be similar.

Milder initial illnesses do not necessarily mean that Omicron is less likely to lead to long COVID, doctors, researchers and patient-led groups caution. Studies from earlier waves of the pandemic indicate that a small percentage of people who had mild or asymptomatic initial reactions to coronavirus infection went on to develop long COVID.

Can vaccines prevent long COVID?

Maybe.

Vaccines primarily prevent people from getting seriously ill or dying from a coronavirus infection. With some previous variants, vaccines seemed to reduce the likelihood of infection itself — and not being infected is, of course, the best way to avoid long COVID. But vaccines have not been as effective in preventing infection with Omicron, and breakthrough infections with this new variant are far more common.

Studies looking at vaccinated people and long COVID have so far mostly focused on data collected before the emergence of the Delta variant. And the study results have been mixed.

One large study, which was published in the journal The Lancet Infectious Diseases, was based on reports to a phone app by more than 1.2 million British adults who had received at least one dose of a coronavirus vaccine between December 2020 and July 2021. It found that people who had received two

vaccine doses and gotten breakthrough infections were about half as likely as people who had not been vaccinated to report symptoms lasting at least 28 days after their infection.

But results from another study, also not yet peer-reviewed, were more discouraging about the ability of vaccines to prevent long COVID. The study was conducted by researchers in the United Kingdom who analyzed electronic medical records of patients in the United States. It compared about 10,000 people who had received COVID vaccines with a similar number of people who had not been vaccinated against the coronavirus but did have a flu vaccine — an effort to limit the number of people in the study who might be considered vaccine hesitant or who generally had less healthy behaviors, the researchers said.

The study found that having a coronavirus vaccine before being infected did not reduce the risk of most symptoms of long COVID. There was some suggestion from the data that vaccinated people might be at lower risk of long-term issues like abnormal breathing and cognitive symptoms, the authors wrote, but all those results were not statistically conclusive.

Experts are still not sure about the cause of long COVID, and different symptoms might have different underlying causes in different patients, which all need to be studied more.