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# Investigating the Effects of Message Framing on College Students' Risk Perceptions and Protective Responses to Adenovirus

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# Investigating the Effects of Message Framing on College Students' Risk Perceptions and Protective Responses to Adenovirus

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*The purpose of this study is to investigate how message framing influences people's risk perceptions, protective action decision making, and behavioral response. We make a case for both revising and extending the use of the protective action decision model (PADM) and message framing theory to examine the message characteristics of the adenovirus warnings during this crisis event, as well as participants' impressions and behavioral responses to health risk communication messages. The data were collected from three focus group sessions, held at the University of Maryland. We found evidence to suggest that fear appeals and efficacy focused messaging may increase the effectiveness of health risk messages for university virus outbreaks.*

Keywords: protective action decision model, message framing, adenovirus, fear appeals, efficacy

In the fall of 2018, the University of Maryland (UMD) experienced an outbreak of adenovirus. At the onset, adenovirus presents similarly to the cold and flu viruses, but symptoms may more quickly become severe

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and persist for longer periods of time. The Centers for Disease Control and Prevention (CDC) describe adenovirus as an illness which can present like a common cold, with patients suffering mild symptoms such as cough, sore throat, and fever, to more severe symptoms resembling bronchitis or pneumonia (National Center for Immunization and Respiratory Disease, 2018). Transmission of the virus occurs primarily through breathing in infected moisture in the air and contact with contaminated surfaces, which are difficult to disinfect because adenovirus is *non-enveloped* and can survive on surfaces for long periods of time (Khanal et al., 2018). There are many strains of adenovirus, but from the early 1970s until the late 1990s vaccines existed to treat two of the more prevalent strains, adenovirus type 4 (Ad-4) and adenovirus type 7 (Ad-7) (Russell et al., 2006).

In 2005, an outbreak of adenovirus type 3 (Ad-3) infected 35 patients at a pediatric long-term care facility in Illinois. Seventeen of these patients required intensive care, and two died (James et al., 2007). On February 3, 2017, the New Jersey Department of Health (NJDOH) was alerted to an outbreak of respiratory illness, later determined to be Ad-7, at one of the state's substance abuse facilities. Seventy-nine probable cases were identified among the facility's patients, including four hospitalizations and three fatalities (Rozwadowski et al., 2018). In the fall of 2018, an outbreak of adenovirus at another New Jersey health care facility resulted in more than 30 children becoming sick, 11 died from the virus.

On November 19, 2018, UMD issued the first of a series of emailed risk messages alerting students that an adenovirus outbreak had been identified on campus. Six students were diagnosed with the virus during the two weeks preceding the message. The next day, another notification was issued informing the campus community that a student died from strain Ad-7, which is known to cause more severe symptoms (Russell et al., 2006). Later messages indicated that more than 20 of the university's students were diagnosed with various strains of the highly contagious virus. From November 19, 2018 through January 25, 2019, the school's administration issued no fewer than eight emailed risk messages mentioning adenovirus.

Effective communication requires understanding and addressing the target audience's information needs and concerns (Ataguba & Ataguba, 2020; Rutsaert et al, 2013). A well-organized health risk communication strategy is necessary for informing and preparing at-risk publics and encouraging protective action decision making. Although most published health communication literature is atheoretical (Beck et al., 2004; Thompson, 2006; Witte et al. 1996; Kim et al., 2010), research in this area that is theoretical often uses the theory of planned behavior (TPB) (Catalano et al., 2017; Kim et al., 2010). The TPB accounts for how attitudes and social norms serve as determinants of intention, but it does not directly explain how background factors and other variables, such as information channels and message framing, influence an individual's perceived level of risk or their intentions

to adopt risk mitigating behaviors (LaMorte, 2018). The protective action decision model (PADM) provides a more comprehensive framework for examination of message effects (Lindell, 2018; Lindell & Perry, 2012).

The PADM is commonly used by disaster communication scholars to explain the process of protective action decision making in response to natural or man-made disasters, but few publications have assessed its viability in a health risk communication context. To fill this gap, this study proposes an extension of the model by combining it with message framing theory (MFT), which explains how message features, such as gains and loss frames, efficacy, and emotional appeals, influence perceptions of risk and motivate message recipients to comply with recommended actions (Abreu, 2015; Nan et al., 2018). Most health and risk communication studies that use the PADM are conducted quantitatively, to make predictions for generalizable events. This study offers a more detailed explanation for why message frames enhance the PADM and make it a suitable model for the design and execution of health-related behavioral interventions.

## The Protective Action Decision Model and Risk Perception

The PADM is a multi-staged, sequential model that offers a nearly complete picture of risk warning processes that influence perceptions, and by doing so, determine an at-risk persons' intentions and decisions to take action (Lindell, 2018; Lindell & Perry, 1992, 2004, 2012; Sellnow & Seeger, 2013). Folk et al. (2019) used the PADM to examine human threat assessment and protective actions in response to destructive wildfires. More recently, the model was used to examine COVID-19 vaccine decision-making in China (Zhang et al., 2022). The PADM highlights the relationships between information channels (environmental cues, social cues, information sources, etc.), perceptions of threat and protective actions, decision making, and behavioral response (which may be influenced by situational facilitators or impediments) to demonstrate how individuals perceive risks, seek information, and make decisions about whether and how to respond to verified threats. Although the model is intended to operate as a step-by-step process, some message receivers may skip a step or two in the sequence if the information source is exceptionally compelling or creditable (Gladwin et al., 2001).

The sequence begins with information channels, which initiate a cognitive process that Lazarus and Folkman (1984) referred to as *primary appraisal*. During this stage, receivers attend to potential threats that are signaled via the information channels and interpret the cues to determine whether they perceive themselves to truly be at risk, whether protective actions are necessary, and to determine which additional stakeholder groups may also be at risk. If the receiver decides that protective action is required, they will identify the situational facilitators (who or what can help mitigate the risks) and situational impediments (obstacles) to decide which protective

actions should be taken. Typical protective action behavioral responses include searches for additional information (e.g., locations of local shelters or clinics, anticipated timeline of events, etc.), protective actions (e.g., evacuate, shelter in place, physician's visit, etc.), and emotion-focused coping (e.g., journaling, meditation, distractions, etc.) (Sellnow & Seeger, 2013).

Small threats can quickly become significant, particularly when the threat targets a mass of people in a confined setting. Tuckwell and Toubiana (2007) demonstrated this in a study that modeled how viruses spread in spatially distributed communities. In an experimental study that tested human threat perceptions, Levari et al. (2018) found that when long-perceived threats become less common, humans will define *threat* differently and will attach the definition to more stimuli. Therefore, humans are continuously, consciously or unconsciously, scanning our environments for cues that might signal a threat. The PADM illustrates that protective action decision making is a cyclical process, which helps us to manage our responses when we encounter such cues. Thus, we ask the following research question:

> *RQ1: How, if at all, did students perceive and respond to the messages distributed by UMD pertaining to the adenovirus outbreak?*

## Message Framing Theory

Although the PADM is inclusive of media as an information channel (information source), it doesn't account for message characteristics that may influence a person's risk perceptions. Thus, this study will combine the PADM with message framing theory to assess how message framing and message channels affect the protective action decision making process, and ultimately, behavioral responses to perceived health risks.

Message framing theory is frequently used to study behavioral health messages, most commonly to determine which framing format will be effective in persuading publics to adopt recommended behaviors (Lee et al., 2018; Rothman et al., 2006; Latimer et al., 2007). Nan et al. (2018) applied message framing theory (e.g., gain-loss framing) to explain why people complied with the advocacy. These delineating characteristics of message framing make it more compatible with the PADM than other forms of framing. The purpose of this study is to explain how message framing influences protective action decision making to inform the future health communication efforts of scholars and practitioners in this area.

Adenovirus has been an unexplored topic for health risk communication research, but several studies have investigated the effects of message framing on risk perceptions for other communicable diseases. Ort and Fahr (2018) used the Extended Parallel Process Model (EPPM) to compare how health communication recipients responded to two types of message frames referencing Ebola virus disease (EVD) vaccinations – fear appeals and self-efficacy. Their results demonstrated that messages which promoted

efficacy in relation to EVD were more effective at prompting a protection motivated response than those that used fear appeals, which resulted in more defensive reactions. However, numerous studies have proven fear appeals to be effective, particularly when they are combined with fear reduction information and promote efficacy (Maddux & Rogers, 1983; Rogers, 1985; Xue et al., 2016).

Two research studies addressing risks for the AIDS virus demonstrated the effectiveness of fear appeals. The first, conducted by Witte (1991), tested the combination of fear appeals and condom efficacy messages on sexually active college students. The authors found that condom use increased when risk messages combined high AIDS threat with high condom efficacy, and condom use dropped when messages combined high AIDS threat with low condom efficacy. The results suggested that AIDS risk messages should combine high threat with behavioral recommendations that are determined to be effective. The second study, by Sampson et al. (2001), looked at fear appeals in AIDS risk messaging as presented to stakeholders in two different collectivist cultures and one individualist culture. The authors wanted to determine if message framing results found in an individualist culture would translate to cultures that prioritized group needs over individual ones. They found that in collectivist cultures, fear appeals were more concerning when the threat was directed at family members rather than self, however attitudes towards AIDS prevention were higher in both types of cultures when the messages highlighted self-efficacy rather than recommended measures for family, and intentions to adopt recommended actions were higher among participants from individualist cultures.

This paper focuses on another revision of the PADM to include message framing as a catalyst for the pre-decision process of protective action decision making. This research provides detailed justifications for the inclusion of message framing and illustrates how the proposed revision of the model can be used in emergency health communication. To do so, the study will answer the following research question:

> *RQ2: How do message framing features affect people's risk perceptions and protective responses to adenovirus?*

## Method

### Sample

This study received Institutional Review Board approval prior to the onset of data collection. Three focus groups were conducted with undergraduate students at UMD. Each focus group session lasted for one hour, and the group was composed of six students and one of the researchers. The focus groups were held in late April and early May 2019. The participants' demographic data can be viewed in Table 1.

Table 1.

| Focus Group Date | Participant # | Participant's Sex | Participant's Race/ Ethnicity | Participant's Academic Level |
|---|---|---|---|---|
| Friday, 4/26/19 | A1 | Female | White | Freshman |
| Friday, 4/26/19 | A2 | Female | Asian | Sophomore |
| Friday, 4/26/19 | A3 | Female | White | Freshman |
| Friday, 4/26/19 | A4 | Male | White | Sophomore |
| Friday, 4/26/19 | A5 | Female | White | Freshman |
| Friday, 4/26/19 | A6 | Female | White | Freshman |
| Friday, 5/3/19 | B1 | Female | Black | Freshman |
| Friday, 5/3/19 | B2 | Male | White | Sophomore |
| Friday, 5/3/19 | B3 | Male | White | Sophomore |
| Friday, 5/3/19 | B4 | Female | Asian | Freshman |
| Friday, 5/3/19 | B5 | Female | White | Freshman |
| Friday, 5/3/19 | B6 | Male | Asian | Freshman |
| Friday. 5/3/19 | C1 | Female | White | Freshman |
| Friday. 5/3/19 | C2 | Male | White | Junior |
| Friday. 5/3/19 | C3 | Female | White | Freshman |
| Friday. 5/3/19 | C4 | Male | White | Freshman |
| Friday. 5/3/19 | C5 | Male | Asian | Junior |
| Friday. 5/3/19 | C6 | Female | White | Freshman |

## Procedure

Before beginning the focus group sessions, participants were informed of the researchers' wish to audiotape for purposes of accuracy and transcription. To ensure anonymity, the researchers refrained from using any personal identifiers while leading the focus group discussion and assigned alpha-numeric identifiers to each participant in the transcript. All the interviews were conducted in English.

To answer RQ1, the participants were engaged in discussion about the adenovirus event, their initial risk perceptions, and thoughts about the risk messaging they received. After sharing their memories of the event, the participants were provided with copies of all the messages which were distributed by UMD and were asked to review them and reassess their responses. The messages were released by UMD between November 2018 and January 2019, and included six emails, eight Twitter posts, and one Facebook post.

To obtain answers to *RQ2*, the participants were provided with three

samples of adenovirus risk messaging representing different levels of fears and efficacy. The first message sample was an original UMD message representing a high efficacy, low fear warning. Two other messages were fabrications, one was designed to be a high fear, low efficacy risk message and the other message balanced fear and efficacy. Participants were asked to give their impressions of the message framing samples and the likelihood that risk perceptions, protective action decision making, and behavioral responses could be influenced by the frames. Participants were also asked which information channels they most frequently turn to for information about emergencies and whether they believed the preferred message framing design would be appropriate for dissemination via the preferred information channels.

### Protocol

The questions outlined for RQ1 were intended to gain a detailed account of how participants perceive and respond to the messages distributed by UMD pertaining to the adenovirus outbreak. Some of the questions that were asked to answer RQ1 included "Do these messages make your risk perceptions increase or decrease? Why?" and "How do you feel about the recommended protective actions in these messages? Can you perform the recommendations? Why or why not?"

In RQ2, we sought to gain an understanding about what message framing features affect participants' risk perceptions and protective responses to adenovirus. The questions for RQ2 included: "What characteristics do you remember about the messages that you received?" and "What features do you think increased risk perceptions? What could make them more persuasive?"

### Approaches to Data Analysis

The focus group sessions were audio recorded and manually transcribed for ease of data analysis (Gibbs, 2018). Copies of all UMD messages and all focus group transcripts were uploaded to NVivo for coding and thematic analysis (Maguire & Delahunt, 2017). An abductive approach was employed for coding and analysis of the data in this study. This approach identifies themes that answered the research questions, as well as themes that provided more insight into student reactions and feelings about the event, which also might have influenced their risk perceptions and protective action decision making.

## Results

The focus group content was coded for themes attached to information recall about UMD's adenovirus messages and students' perceived level of risk during the event, impressions of message content and frames used by UMD, perceptions or thoughts about the effectiveness of the information

channels that were used or could have been used, and students' impressions about the message framing features that could be used in the future.

## Risk Perception and Response to Risk Messages (RQ1)

### *Initial Perceptions of Risk Communication*

Most of the participants did not remember reading the UMD emails, and those that did only vaguely remembered the content. Those who recalled receiving the messages but not reading them indicated that university messages are often ignored because students are inundated with too many irrelevant emails from the school. Students are more likely to respond to messages that have clear subject lines which signal urgency.

Several of the participants mentioned that they first heard of the adenovirus outbreak from their parents, who also received the first UMD email about the issue on November 19, 2018. Some also said they and their families first learned of the event from watching televised news, which was providing national coverage of the event following the announcement of a student's death. The news stories and earliest UMD emails were released while the participants were away from school for Thanksgiving break.

Two of the six emails stated, "there is no specific medication to treat this infection in a non-hospitalized individual," and 12 of the 18 participants indicated that they interpreted this particular message to mean that adenovirus was low risk and individuals who contracted it would not require medical treatment or medications. Of the remaining participants, four were angered that the emails included information that was essentially useless and perceived it to be intentionally fear suppressing. Two of the remaining participants did not have an immediate opinion about the messages. All of the participants were angered when review of the first message informed them that UMD had been made aware of a potential adenovirus outbreak as early as November 1, 2018 but did not alert the students until November 19, 2018.

All of the University's emails included reassuring information about steps that the university was taking to sanitize dormitories, classrooms, and other communal spaces on the campus. Participants were skeptical that UMD was sanitizing as much space as the administration claimed that it was. One participant described returning from winter break to find that her dorm room had been skipped because her roommate left a cup on her desk and mentioned that she heard similar reports from other students. Another participant simply said, "I don't believe anything the University says anymore." Other students indicated that they believed that the number of adenovirus infections on campus was likely much higher than what UMD was reporting because students don't always seek care from the university's health clinic.

### *Responses to Communication Channels*

Participants did not believe that UMD's chosen information channels were the best options. As previously mentioned, students have the tendency to

ignore university emails unless the subject line makes it clear that the message is emergency related. While some participants follow UMD on Twitter, they more frequently attend to posts from people they know and student groups that they are affiliated with. Participants recommended that, in the future, UMD should partner with student groups to promote health information. They also said their parents were only copied on the first email and all future emails of this type should always copy parents. When asked what information sources they are most likely to consider as credible, students indicated they always take seriously warnings that they receive from their teachers and from the school's text message alerts. They suggested prioritizing these channels for future health risk messaging.

## Message Framing Features and Risk Perception (RQ2)

### *Fear Appeals*

Emotional appeals in messaging can influence perceptions of risk and the perceived value of recommendations, but UMD only used fear appeals twice. The first message sample that used fear appeal informed students that the most severe form of adenovirus had been confirmed in several of the diagnosed cases on campus. The second message sample reinforced the first fear invoking message by stating, "This strain may cause more severe illness, particularly for those with chronic medical problems like asthma, diabetes or illnesses that lower their immune system or those who take medicine that lowers their immune system." This message sample also highlighted increased risk for immunocompromised individuals (Echavarria, 2008).

### *Efficacy*

Although all of the UMD's messages contain some portion of efficacy information, coding revealed that there were only four original examples from the emails, and three similar examples in the social media posts. Examples include:

> 1) Do not return to campus if you are sick, particularly with a fever. Stay at home to rest and recover. In advising community members with influenza-like-illnesses (including Adenovirus), the UHC recommends that those who are sick return home via non-public transportation, if feasible. Students should stay in their living spaces and avoid crowded areas to avoid spreading the infection.
>
> 2) Get a flu shot, if you have not done so already. Influenza season is underway, and a flu shot is an excellent way to protect yourself and those around you. There are flu shots available at the UHC and local pharmacies in College Park.
>
> 3) Wash your hands frequently with soap and water or use hand sanitizer, avoid those who are ill, cover your cough and avoid

sharing food, utensils, cups, and water bottles.

4) Clean high touch surfaces in your room with an anti-bacterial cleaner. Bleach wipes are very effective; follow the instructions on the packaging.

**The Effectiveness between Fear and Efficacy Interventions**

Focus group participants were asked to compare three different social media messages, all containing a message and a graphic, and indicate which message format they believed was most persuasive and would inspire more people to adopt recommended actions.

The first message shown was the original UMD social media post, which was entirely efficacy focused. The message encouraged audiences to visit a link for tips about how to avoid viruses and stay healthy, and the graphic that was presented alongside the message was the original blue and white efficacy graphic. Students indicated that the graphic wasn't very helpful, and the text offered no useful information. They said that if they were scrolling through social media, it would not grab their attention. One student also had a negative response to the use of the term "Terps," referencing UMD's student body, which was used as an attention grabber in the message. She said, "by using the nickname, UMD was signaling that the message was not serious."

The second social media sample contained fear framing, but no efficacy information. The content read "40+ students have been diagnosed with adenovirus, and one student has died. The virus can be transmitted through air or touch. Those with compromised immune systems are at particularly high risk." The graphic that was combined with this message was in full color on a blue background and depicted an ill man who was coughing and a picture of infected lungs. Participants indicated that this social media sample was also ineffective. They liked the message content, but because the graphic did not give any information, it was determined to have no utility. Participants indicated that the text would have caught their attention, but the entire message packaging was not engaging enough to be share-worthy or inspire peer discussion.

The third social media sample contained a message that combined fear and efficacy information. It read, "40+ students have been diagnosed with adenovirus, and one student has died from the most severe strain (Ad-7). The virus can live on surfaces for long periods of time and can spread through precipitation. To protect yourselves, please follow these tips." The original UMD graphic was paired with the message. All focus group participants found this to be the most useful of the three samples and indicated that it was the only message that triggered a protective action response in them. Students recommended the addition of "more eye-catching graphics" and efficacy-building information specific to adenovirus, rather than viruses in general.

### *Experienced Fear*

The participants were evenly divided as to whether they experienced a heightened sense of risk in response to the messages. All participants who experienced fear or concern for their health attributed their response to the knowledge that a student had died. Some students said that their fear was heightened because they became ill around the same time the outbreak was occurring or knew someone who was ill. None of the participants claimed to have been diagnosed with adenovirus, but one believes he had contracted the virus and didn't seek treatment for it. Two of the participants who felt increased fear resided in the same dormitory as the student who died, but only one of these participants was fearful that the virus might spread throughout the dorm. The participants who did not experience increased fear following the first message and news stories shared that being away from campus when the news broke gave them a sense of security. Because UMD was reporting low numbers of diagnosed cases at the time, these students felt confident that the situation would be under control by the time they returned to school.

Participants were given the opportunity to review the original UMD messages and social media posts about the adenovirus outbreak, which spanned from November 19, 2018 until January 20, 2019. Following this review, participants disclosed that the first email triggered a low level of fear because it explicitly informed them that a student died. The remainder of the first email and the entirety of the other two emails that were sent out in November were not considered to have any fear-inducing effects. Fear did not increase until the fourth email, which indicated that the number of diagnosed cases had risen to 35. In this message, students were advised not to travel if they were exhibiting symptoms commonly associated with adenovirus. Participants were critical of the travel warnings. A female participant who is an out-of-state student said,

> They sent that message to us a little too late. By the time I got it, I'd already booked my flight, and sick or not, it was winter break. I had to go home. It's not like we could just stay here until we felt okay to travel.

The participants debated over the value of the efficacy information offered in the emails. The first three emails recommended basic cold and flu precautions, such as washing hands and surfaces, getting rest, and avoiding others who might be sick. Participants felt these precautions offered little to no value and most said they did not adhere to them. Three participants said they increased hand washing and carried hand sanitizer after exposure to the efficacy information. Upon reading the last email, which gave more detailed instructions about how students should protect themselves, such as cleaning surfaces with bleach wipes, some participants commented that UMD should have been more explicit about which products would effectively kill

the virus. One participant said, "I'm in college. On the rare occasion that I clean anything, it's with whatever spray cleaner is around. If they'd told us to use bleach wipes back when this first happened, I would have bought some then."

### *Experienced Anger*

The first focus group spent nearly five minutes expressing their anger over UMD's messages, specifically because they felt the messages lacked sympathy for the family of the student who died and for the other students who were hospitalized. The only mention of the deceased student was in UMD's first email, and there was no mention of her in any of the school's official social media posts. Additionally, one participant from the second focus group pointed out "the early emails informed us the clinic wasn't offering testing for adenovirus." He said that by sending this message, UMD was telling students "We're not concerned about your cold symptoms. You shouldn't be concerned." which the group determined was a deliberate fear-suppressing tactic. Another participant in the group thought UMD was trying to contain the crisis and prevent damage to the school's reputation. He theorized "UMD didn't want the adenovirus outbreak to become a bigger issue for the media to focus on" while it dealt with the aftermath of other significant health crises, including the death of football player Jordan McNair and the dormitory mold issue.

## Discussion and Conclusions

This study sought to make a case for the inclusion of message framing (Abreu, 2015; Nan et al., 2018) in the PADM (Lindell, 2018; Lindell & Perry, 1992, 2004, 2012; Sellnow & Seeger, 2013) and provide evidence for the model's utility across disciplines of risk communication. The combined findings of the focus groups demonstrate the importance of message design in the protective action decision making process and the need for message frames that use strong emotional appeals and efficacy phrasing. By adopting a primarily informative, unemotional tone and limiting the use of urgency phrasing, UMD's communication suggested that the information was not critical and the risk level was low. As a result, students did not follow the recommended actions. In hindsight of the event, students felt that UMD's communication around the adenovirus event did the student community a disservice and may have worsened the health crisis.

UMD should have used a combination of fear appeals and efficacy information in its early adenovirus communication. This type of message design strategy serves to legitimize a crisis by heightening message recipients' threat perceptions while reducing their need to information search for solutions. By prescribing effective risk mitigation solutions, fear and efficacy framed messages empower at-risk publics to respond quickly to health threats. The most effective protective action that UMD recommended to students

was to use bleach wipes to clean surfaces; however, this was not shared with students until they returned from winter break. By that time, countless students had already come into contact with the virus and fallen ill. Had UMD shared this efficacy information in October 2018, when health professionals first observed that adenovirus was starting to circulate on campus, the crisis and threat level to the larger student population could have been mitigated. From this, we conclude that message frames are crucial to the design of intervention messaging and the protective action decision-making process.

## Limitations

Limitations of this study should be acknowledged. First, we investigated the relationships between message framing and people's perceptions and responses to these messages. However, this research design was not experimental, so claims of causality cannot be made. Second, we used a small sample of articles in this study because the university's communication about this event was infrequent and persistent. However, future studies could consider a larger sample size to test the relationship between message framing and risk perception and response to prevention information. Third, the three focus groups only reflect the perspectives of eighteen members of a community that comprises more than 40,000 students. Although a qualitative assessment of this case provides rich, detailed insight, a quantitative approach to the study could have offered more generalizable data.

## Future Research and Practice

The findings of this study offer some important implications for practice and future research in the areas of health communication and risk mitigation. This study offers empirical evidence to support the use of message framing tactics, including gain and loss frames, in health messaging targeting students. Communications concerning health risks that affect students should strategically include fear appeals and self-efficacy building information. Such messages should also avoid the use of phrasing that discourages audiences from seeking medical care, as UMD's communication did by informing students that testing would not be available on campus and that there were no viable treatments outside of a hospital setting.

There are also implications for the importance of timing of communication when health risk events create compounding crises. Because the University was responding to another type of crisis and had not fully recovered its reputational capital, participants of this study perceived that the fear-suppressing theme of UMD's communication was intentional and strategically done to reduce the publicity of this issue. The current body of literature on communication and compounding crises is very slim, and there is a ripe opportunity for scholars to develop and test theory in this area.

Future scholarship can also advance the findings of this study by examining other ways that the PADM can be applied beyond the scope of

natural disasters, as well as experiment with the application of other health and risk models in a non-traditional context. Research should also extend the literature that explains the relationships between message frames, information channels, and the pre-decision process of protective action decision making. Because the COVID-19 pandemic had significant effects on global publics, many scholars have used MFT to examine COVID-19 risk reduction and inform message campaigns addressing quarantining, mask-wearing, and vaccines (Borah et al., 2021; Gursoy et al., 2022; Hong & Hashimoto, 2021). We suggest future research in this area apply our extended PADM model and evaluate its impact on protective action decision-making outcomes.

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## Appendix A

### Focus Groups Protocol

**Demographics:**

1. How old are you?
2. What year are you in?

**Questions pertaining to RQ1:**

1. What do you remember about the fall 2018 adenovirus outbreak on campus?
2. Do you remember seeing any risk messages from the University about the event? If so, where?
3. What characteristics do you remember about the messages that you received?
4. Can you recall if the messages included any protective action recommendations? If so, what were they?
5. How did the University messages make you feel about your personal level of risk for contracting adenovirus?
6. Did you turn to any other sources for information about this event? If so, what were they and why did you choose that source? Which of these is your favorite and why?
7. Did you follow any of the recommended protective actions? If so, what were they and what convinced you to do so?

**Questions pertaining to RQ2 (display samples of edited University messages with alternative framing):**

1. (Display samples of University adenovirus Risk Messaging). These are some of the original University risk messages. What features do you think increase risk perceptions? What could make them more persuasive?
2. What do you think about the recommended actions? Are they doable, is there anything missing that you would like to know more about?
3. Do these messages make your risk perceptions increase or decrease? Why?
4. How do you feel about the recommended protective actions in these messages? Can you perform the recommendations? Why or why not? Is anything missing from these messages that could make them more convincing? If so, what? Is there anything missing that you would like to know more about? If so, what? How would you perceive these messages if they appeared on your favorite information channel?