How Emotional Triggers in News Coverage Influence Public Responses to Health Threats

Scott Clifford
Assistant Professor
University of Houston
saclifford@uh.edu

Jennifer Jerit
Associate Professor
Stony Brook University
jennifer.jerit@stonybrook.edu

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ABSTRACT

Outbreaks of infectious disease are increasing in frequency and generate powerful emotional responses. Existing research focuses on the role of anxiety and its promotion of information-seeking, learning, and trust. Yet, recent cases, such as the latest outbreak of Ebola, have been characterized by misinformation, low levels of trust, and support for exclusionary policies. We argue that disgust, an emotion that serves to protect us from disease, plays an important role in attitudes towards public health threats. In a series of experiments, we manipulate both disgust and anxiety in the portrayal of a new health threat. Our results show no evidence that either emotion influences policy attitudes or learning. However, we find diverging effects on information search, with anxiety increasing the desire for more information and disgust having the opposite effect. Our results suggest that greater attention to the influence of media coverage on discrete emotional responses is essential for understanding how the public responds to health threats and the most effective way to inform people in a time of crisis.
The outbreak of infectious diseases, such as SARS, Ebola, and avian flu, has been increasing in frequency over the last several decades (Smith et al. 2014). Such public health crises often generate powerful reactions from the public, but we know little about the source of these reactions and why they vary from case to case. For example, the 2009-2010 outbreak of H1N1 included over 60 million cases inside the United States, resulting in over 12,000 deaths (CDC 2014). In contrast, the 2014 Ebola outbreak resulted in 6 cases in the United States, only 2 of which were contracted in the country by healthcare workers. Despite the difference in the threat posed by each outbreak, the public was just as worried about personally contracting Ebola as they were H1N1 (Dugan 2014). Perhaps as a result, in the case of Ebola, nearly three quarters of the public (72%) supported mandatory quarantines of anyone who had recently traveled to western Africa and more than half (56%) said they would be willing to block entry to the United States (Frankovic 2014). Thus, the manner in which the public responds to these crises has important implications for the policy solutions it endorses.

In this paper, we argue that greater attention to the distinct effects of two emotions—anxiety and disgust—can help scholars understand how people respond to public health crises. An extensive body of work has documented the influence of anxiety (or fear) on political beliefs and preferences.¹ Factors such as the number of cases of a particular disease, how it is spread, and the severity of the symptoms are all likely to generate feelings of anxiety. According to past

¹ Scholars often use the terms “fear” and “anxiety” interchangeably (Gadarian and Albertson 2014; Huddy et al. 2005), though there are some neurological and behavioral differences between the two emotional states (see Ohman 2008 or Sylvers, Lilienfeld, and LaPrairie 2011 for discussion).
research, anxiety should drive greater information seeking, persuasion, and trust in relevant authorities such as public health officials (Albertson and Gadarian n.d.; Brader, Valentino, and Suhay 2008; Marcus, Neuman, and MacKuen 2000). Yet in spite of high levels of anxiety surrounding Ebola, the American public was uninformed about the disease, held a number of misperceptions about its transmission, and expressed low levels of trust in the government to handle a potential outbreak. Concern about Ebola did not seem to generate the higher levels of knowledge and trust that characterize past public health threats.

Although media coverage about the 2014 Ebola outbreak undoubtedly promoted anxiety, it also likely elicited disgust (Casey 2015), an emotion whose purpose is to protect the body from pathogens. News stories devoted considerable attention to the symptoms of the disease, which included many potent disgust elicitors. For example, a New York Times story stated that “Ebola’s catastrophic course includes diarrhea, vomiting and hemorrhaging of blood….” (Wines 2014). Another story described how the virus could spread on public transportation: “If someone ejected bloody mucus or vomitus onto a subway pole, and the next passenger were to touch it while it was still wet and… put those wet fingers into an eye or mouth instead of wiping them in disgust” (Badger 2014). There is reason to suppose, then, that in addition to anxiety, individuals reacted to the Ebola outbreak with disgust.

Political events that evoke disgust may generate qualitatively different public reactions than threats that do not elicit such feelings. While anxiety and disgust are both negatively valenced emotions, they have distinct appraisal themes and action tendencies (Smith and

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2 For example, an August 2014 survey conducted by the Harvard School of Public Health found that 68% believed that Ebola spreads “somewhat” or “very” easily.
Ellsworth 1985). For example, while anxiety motivates systematic processing as a method for coping with uncertainty and threat, disgust motivates avoidance and tends to reduce responsiveness to new information. As a result, anxiety and disgust may have different consequences for public reactions to health threats, particularly regarding information-seeking. We test our account by experimentally manipulating the presence of disgust cues in the description of a disease, and by measuring individual differences in sensitivity to disgust. Overall, we find little evidence that experimentally manipulated anxiety or disgust influence policy attitudes or enhance memory. We also find little evidence that feelings of anxiety or disgust influenced policy attitudes, however, disgust sensitivity consistently predicted support for exclusionary policy attitudes and protective behaviors. We find the clearest divergence between anxiety and disgust on information search: Anxiety increased the desire for information while disgust decreased it.

The Existing Literature

Our discussion begins with anxiety because there are a number of established findings regarding the effect of anxiety on information processing and political behavior.\(^3\) We then turn to the role of disgust. While the emotion of disgust has seen increased scholarly attention as a result of its potent effects on certain political outcomes, few studies systematically compare disgust to other negative emotions. Moreover, there is little evidence regarding the role disgust may play in political information processing.

\(^3\) Indeed, Brader and Markus describe fear as “the most studied emotion, not only within political psychology…but also in the social sciences more generally” (2013, 177).
The Effects of Anxiety

One of the most robust patterns associated with anxiety is increased information-seeking (e.g., Brader, Valentino, and Suhay 2008; Brader 2005, 2006; Gadarian and Albertson 2014; Marcus, Neuman, and MacKuen 2000). Anxious individuals seek to cope with (or regulate) the emotion by directing their attention to the source of the threat. An early elaboration of this relationship comes from Affective Intelligence Theory (Marcus, Neuman, and MacKuen 2000). According to this perspective, anxious people are more likely to engage in systematic processing and become more open to new ideas and evidence. Based upon AIT and subsequent research, exposure to an anxiety-provoking story about a public health threat should motivate people to seek out more information about the topic (H1).

The consequences of anxiety for learning and knowledge are less clear. Some research finds that anxious people are more likely to base their political decisions on contemporary information rather than cues like partisanship (Brader 2006). Other studies, however, have shown that anxiety is associated with biased information-processing (e.g. Eysenck, 1992; Mathews, 1990; Mogg, Mathews, Bird, & Macgregor-Morris, 1990). Drawing upon this second body of work, Gadarian and Albertson (2014) find that while anxious people are more likely to seek out information than non-anxious people, they disproportionately seek out threatening news. Likewise, although there is some evidence that anxiety is associated with learning (MacKuen et al. 2010), other work has shown that anxiety results in worse cognitive function, in terms of recall of politically relevant facts (Huddy et al. 2005). Consequently, we do not have a clear expectation about the relationship between anxiety and knowledge, though at moderate levels the emotion may facilitate learning.
In addition to seeking out information as a way to cope with threat, anxious people demonstrate several tendencies in terms of their policy preferences. Anxious people perceive more risk than those who are not anxious, and they tend to be more risk averse (Lerner and Keltner 2001; Lerner and Keltner 2000). Anxiety also motivates a desire for protection, which has manifested itself in a variety of ways in empirical studies. In the domain of terrorism, anxious people are more likely to support protective, rather than retaliatory policies that are perceived as carrying greater risk (Huddy et al. 2005; Lerner et al. 2003). In the area of public health, like a potential smallpox outbreak, anxious people favor policies that contain the disease (e.g., isolation, quarantining, requiring vaccinations) even if they violate civil liberties (Albertson and Gadarian 2015). Finally, on the issue of immigration, anxiety is related to xenophobic attitudes (Brader, Valentino, and Suhay 2008; Butz and Yogeeswaran 2011) because immigrants are thought to pose an economic or cultural threat (also see Renshon, Lee, and Tingley 2014). Based upon this work, we expect that induced anxiety should make people support policies intended to protect against the outbreak of disease (H2).

**Disgust and the Behavioral Immune System**

Disgust operates as part of a “behavioral immune system” that protects us from pathogens (Curtis, de Barra, and Auenger 2011; Oaten, Stevenson, and Case 2009). Nearly every common disease cue reliably generates feelings of disgust across cultures (Curtis, Auenger, and Rabie 2004). Disgust’s unique appraisal theme is contamination (Horberg et al. 2009) and even brief contact with a disgust-eliciting object is sufficient for perceptions of contamination, transferring feelings of disgust and revulsion to the contaminated object (Rozin, Millman, and
Insofar as disgust serves to keep us away from people or objects that might carry pathogens (Kurzban and Leary 2001), the primary behavioral manifestation of this emotion is avoidance and physical distancing (Rozin, Haidt, and McCauley 2008).

While everyone regularly experiences disgust, some react more readily and more powerfully to disgust elicitors. Disgust sensitivity is a stable, trait-based responsiveness to disgust elicitors, such as bodily fluids, mold, blood, and gore (Olatunji et al. 2012a; Tybur, Lieberman, and Griskevicius 2009; Tybur et al. 2013). Supporting this contention, pathogen disgust sensitivity predicts physiological responses to disgusting images, contamination fears, and washing symptoms of obsessive-compulsive disorder (Olatunji et al. 2012b).

Disgust and Intergroup Attitudes

Over time, humans have developed a variety of cues that indicate the possible presence of a pathogen in another person. Yet, these cues are imperfect and biased towards false positives (Schaller and Park 2011). Pathogen threat motivates prejudice towards the obese, the mentally ill, and people with physical disabilities (Park, Faulkner, and Schaller 2003; Park, Schaller, and Crandall 2007). Disgust sensitivity and the threat of disease are also related to xenophobic attitudes (e.g., Faulkner et al. 2004; Huang et al. 2011; Navarrete, Fessler, and Eng 2007), as out-

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4 This aspect of disgust distinguishes it from other emotions like fear or anxiety. A person does not take on the properties of a fear-inducing object (e.g., a snake) in the same way that he or she becomes “contaminated” by contact with a disgust-elicitor.

5 There are other aspects of disgust sensitivity that have to do with the domains of sex and morality (Tybur, Lieberman, and Griskevicius 2009). We focus on pathogen disgust sensitivity because it is most relevant to our hypotheses.
group members have historically posed a greater pathogen threat than in-group members (Navarrete and Fessler 2006). As a result, there are well documented relationships between disgust and a variety of exclusionary attitudes, such as opposition to immigration (Navarrete and Fessler 2006) and the dehumanization of outgroups (Buckels and Trapnell 2013; Hodson and Costello 2007; Sherman and Haidt 2011).

During disease outbreaks that originate in foreign countries, disgust may play a crucial role in the formation of public opinion through its relationship to xenophobic attitudes. News coverage can exacerbate this relationship, either by highlighting aspects of the outbreak that cue disgust or emphasizing the foreign origin of a virus. A dramatic recent example is Newsweek’s cover story about the prospect of a U.S. Ebola epidemic being started by smuggled bushmeat from Africa (Dionne and Seay 2015). Not too surprisingly, during the Ebola outbreak a majority (56%) of the public favored banning travel from afflicted countries, and virtually anyone who had traveled on the African continent was a target for exclusion (Dionne and Seay 2015). Based upon the literature on disgust and intergroup attitudes, we expect that people who are dispositionally sensitive to disgust will be more likely to favor exclusionary policies in the face of a threat to public health (H3). Exposure to media coverage that primes disgust should increase the desire for exclusionary policies (H4), and this relationship should be strongest among those who are disgust sensitive (H5).

Disgust, Attention, and Information Search

In addition to its unique role in motivating exclusionary attitudes, we expect disgust to influence information processing in two different ways. First, in the short-term disgust may

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6 https://today.yougov.com/news/2014/10/15/high-support-ebola-quarantine/
direct attention towards the disgust-eliciting object. Previous research demonstrates that disgust, evoked through words or images, causes people to automatically orient attention towards the offending object (Cisler et al. 2009; van Hooff et al. 2013, 2014; Xu et al. 2015). Disgust also enhances memory for the eliciting object above and beyond fear, an effect that cannot be accounted for by arousal alone (Chapman et al. 2013; Croucher et al. 2011). We therefore expect that media coverage of a public health threat that primes disgust will increase the retention of information related to the disgust elicitor (H6).\(^7\)

Beyond the immediate reaction to an eliciting object, disgust may disrupt subsequent attention and learning. Research has shown that disgust, but not fear, decreases unconscious inhibitory control (Xu et al. 2015), and that the former impedes processing of subsequent information (van Hooff et al. 2013). Disgust also impairs attention among disgust-prone subjects and may serve to disrupt ongoing purposeful behavior (Cisler, Olatunji, and Lohr 2009). Indeed, research on the effectiveness of anti-smoking messages finds that threat increases recall, while the addition of disgusting imagery reduces recall of the associated text (Leshner, Bolls, and Thomas 2009; Leshner et al. 2010). Writing about the 2014 Ebola outbreak, Casey observed that “[disgust] also may keep [people] from listening to further information and instead encourage cognitive distance from the disgusting topic” (2015, 7). We therefore expect that induced disgust will make a person less likely to seek out information about the eliciting object (i.e., a person will avoid further exposure to the topic) (H7).

\(^7\) It is unclear whether disgust sensitivity will play a role in learning when the source of disgust is task-relevant. Thus, we have no hypothesis about the role of disgust sensitivity or its interaction with a disgust manipulation, but we investigate both possibilities below.
Summary

We expect that anxiety and disgust will both play a role in public reactions to a health threat. Both emotions are expected to motivate support for protective policies, though disgust should be more strongly related to support for exclusionary policies that maintain distance from potential contaminants, while anxiety should have broader effects. Both emotions may also enhance learning of the information that elicits emotion, such as symptoms, sources of transmission, and origins of the disease. However, our expectations for each emotion diverge when turning to the downstream effects on information processing. Anxiety should enhance ongoing information search, while disgust should have the opposite effect.

Data and Methods

We tested our hypotheses with a series of randomized experiments administered across three different subject populations: undergraduate students at a large state university (N = 154), non-student adults who worked on or around the university (N = 81), and Amazon Mechanical Turk (MTurk) workers (N = 301) for a total sample size of 536. The studies were administered over a three-month period in the Spring and Summer of 2015. The same questionnaire was administered across all three subject populations, however, the student and adult subjects completed the study in a laboratory setting while MTurk respondents completed the study online at a time and place of their own choosing. 8

8 The dates of the three studies are as follows. The student lab study ran from April 8-10, 2015. The adult lab study was conducted on May 11-15, 2015. The MTurk data was collected on April 20, 2015 and June 17, 2015.
Subjects began by answering background questions on their attitudes towards public health policy, and then read a brief description of a new public health issue. All participants were presented with two paragraphs of text describing an infectious disease, Chikungunya. We chose this particular disease because it has disturbing symptoms that can easily be portrayed as both frightening and disgusting. Chikungunya has spread widely in the Caribbean, but has only begun to show up in the United States, providing an opportunity to honestly portray the disease as a potential future health threat. The stimulus described the symptoms (fever, rash, and excruciating joint pain), its spread throughout the Caribbean, and the method of transmission (mosquitoes).

Within the text we randomly varied two factors, independently manipulating the level of anxiety and the level of disgust elicited by the disease, making a 2 x 2 experimental design. In the Low Anxiety conditions, subjects were informed that the disease primarily spreads in tropical climates, making it unlikely to threaten the United States. The High Anxiety conditions instead highlighted the ease with which a mosquito can transmit the disease and the difficulty of containing mosquitoes. We expected that information about the level of threat posed by the disease would induce anxiety among our subjects and a pretest confirmed our expectations. Following recent work on disgust (Clifford and Wendell 2015; Lee, Sohn, and Fowler 2013; Schnall et al. 2008), we manipulated this emotion using images. In the High Disgust conditions, three images were embedded in the text displaying symptoms of the disease (an inflamed eye and a rash) and a mosquito drawing blood from a person. A pretest confirmed that these images
elicited disgust, but not anxiety.\textsuperscript{9} Subjects in the \textit{Low Disgust} conditions did not receive any images.

Our outcome measures asked about levels of concern, policy attitudes, behavioral intentions, knowledge of the disease, and information search. Concern was measured with three items: level of concern about an outbreak of Chikungunya in the U.S., concern about contracting the disease, and the priority the government should give to the disease. These items were intended to capture perceptions of threat posed by the disease.

For policy preferences, we measured support for seven policies, such as restrictions on flights from afflicted countries and mandatory quarantines of anyone contracting the disease. These outcomes were averaged (\(\alpha = .89\)) and represent a person’s level of support for protective and exclusionary policies (meaning they should be affected by both anxiety and disgust). We also asked a series of questions about two aspects of behavioral intentions that might prevent illness: cleanliness (washing hands, using hand sanitizers, and avoiding crowded places) and general health behavior (exercising, taking vitamins, and getting adequate sleep). Factor analysis supported our distinction between these two dimensions and the factor scores are used below in

\footnotesize{\textsuperscript{9} We pretested our manipulations on 179 subjects recruited from MTurk. As expected, the \textit{High Disgust} conditions created stronger feelings of disgust than the \textit{Low Disgust} conditions (\(t(177) = -5.54, p < .001\)), but did not affect feelings of anxiety (\(t(177) = 0.42, p = .67\)). The pretest confirmed that our \textit{High Anxiety} stimulus generated stronger feelings of anxiety than the \textit{Low Anxiety} treatment (\(t(177) = -3.39, p < .001\), though it also increased feelings of disgust (\(t(177) = -2.30, p < .05\)).}
the analysis. Besides health-related outcomes, we also asked about seven other protective behaviors, such as avoiding travel and time outdoors, and securing screens on windows ($\alpha = .78$).

Following the attitudinal outcomes, we asked subjects about their emotional reactions to the disease. There were four items designed to measure anxiety (afraid, frightened, anxious, worried) and four items measuring disgust (disgusted, grossed out, repulsed, sickened). Analysis of these items is discussed in greater detail below.

Knowledge was measured with three factual questions about the disease. The answer to these items had been provided in the background text on Chikungunya that appeared in all experimental conditions. The facts consisted of the location of the current outbreak (Caribbean), method of transmission (mosquitoes), and symptoms (joint pain, eye inflammation, and fever). Each question relates in some way to the threat posed by the disease and therefore serves as a potential elicitor of anxiety and disgust. The knowledge items will allow us to examine whether anxiety and disgust orient attention and memory towards threatening information.

Our last outcome measure was a question about information seeking. In the laboratory sample (students and staff only), we asked participants if they would like us to send them more information about the disease after the study and we requested their email address. For the MTurk sample, subjects were asked how likely they were to look up more information about the disease.\textsuperscript{10}

\textsuperscript{10} Given that MTurk subjects are incentivized to quickly complete each study, we thought it unlikely that MTurk respondents would request additional reading material. A self-reported measure regarding the likelihood of looking up additional information on the topic seemed more appropriate for this subject pool.
The survey included a variety of items for an unrelated study, as well as personality questions. Near the end of the survey we measured disgust sensitivity using the 7-item pathogen subscale of the Three Domains of Disgust Scale (Olatunji et al. 2012b; Tybur, Lieberman, and Griskevicius 2009). The pathogen subscale of the TDDS is viewed as the best available measure of the behavioral immune system (Lieberman and Patrick 2014; Tybur, Frankenhuis, and Pollet 2014).

**Empirical Results**

*Manipulation Check*

We begin by examining whether the manipulations induced disgust and anxiety. All eight emotion measures were analyzed using exploratory factor analysis with promax rotation (full results are shown in Table A1). Two clear factors emerged, with the four anxiety items loading on the first factor (all factor loadings >.78) and the four disgust items loading on the second factor (all loadings >.71). There was little evidence of cross-loading. All disgust items had loadings less than .22 on the anxiety factor, and all anxiety items had loadings less than .08 on the disgust factor. Moreover, there was only a moderate association between the two additive scales, displayed graphically in the left-hand panel of Figure 1 ($r = .59$).

As for the effectiveness of our treatments, subjects in the *High Disgust* conditions reported significantly higher levels of disgust than respondents in the *Low Disgust* conditions ($t(534) = 6.61, p < .0001$), but levels of anxiety were unaffected by the manipulation ($t(533) = 0.88, p < .38$). Unfortunately, the *High Anxiety* treatment did not significantly increase levels of anxiety ($t(533) = 0.88, p = .38$), nor did it affect levels of disgust ($t(533) = -1.71, p = .09$). We did not find any evidence of interaction between the *High Disgust* and *High Anxiety* conditions,
so we treat the manipulations as two additive factors (see Table A2 for mean levels of disgust and anxiety across all four conditions).

Finally, we examine whether subjects high in dispositional disgust sensitivity were more responsive to the manipulations (shown in the right-hand panel of Figure 1). Self-reported disgust was predicted in an OLS model including dummy variables for the High Disgust and High Anxiety condition, disgust sensitivity, and an interaction between disgust sensitivity and the High Disgust condition. As expected, the interaction term is positive, indicating that the manipulation had a larger effect among the more disgust sensitive ($p = .05$). In fact, the effect of the manipulation was nearly twice as large among those one standard deviation above the mean in disgust sensitivity compared to those one standard deviation below the mean (an increase of .69 versus .39). Notably, there were no significant interactions between disgust sensitivity and either experimental condition in predicting feelings of anxiety, suggesting that disgust sensitivity is uniquely capturing responsiveness to disgust elicitors.
Concern about Chikungunya

As a first step in our empirical analyses, we look at levels of concern about the disease, the expected likelihood of contracting it, and the priority the government should place on the issue. If the High Anxiety stimulus is working as expected, subjects in that condition should express more concern than those in the Low Anxiety condition. We predict each outcome using an ordered logit model controlling for experimental condition and sample. As expected the High Anxiety treatment caused higher levels of concern about an outbreak \( (p < .001) \) and a greater perceived likelihood of contracting the disease \( (p < .001) \). People in the High Anxiety condition also were more likely to state that the government should place a priority on the issue \( (p = .001) \). Even though this manipulation did not generate higher levels of self-reported anxiety, it did reliably generate feelings of concern, as one would expect. In contrast, the High Disgust
condition did not significantly affect any of the concern items. Thus, it seems that information about threat, but not feelings of disgust, motivate general concern about the issue.\footnote{Disgust sensitivity strongly predicts greater concern about an outbreak ($p < .01$), greater perceived likelihood of contracting the disease ($p < .01$), and higher priority given to the issue ($p < .05$). However, there is no evidence of an interaction between disgust sensitivity and the \textit{High Disgust} condition. See Table A3 in the Appendix for full results.}

\textit{Support for Exclusionary Policies}

Next, we analyze support for policies, such as banning flights from afflicted regions and mandatory quarantines of infected individuals. Policy attitudes are predicted using an OLS model with dummy variables for the \textit{High Disgust} and \textit{High Anxiety} conditions, and dummy variables for each sample (students are the omitted category).

\begin{table}[h]
\centering
\caption{Effects of Threat and Disgust on Policy Attitudes and Behavioral Intentions}
\begin{tabular}{lcccccccc}
\hline
\textbf{Outcome:} & \textbf{Policy} & \textbf{Policy} & \textbf{Avoidance} & \textbf{Avoidance} & \textbf{Health} & \textbf{Health} & \textbf{Cleansing} & \textbf{Cleansing} \\
\textbf{Model:} & \textit{OLS} & \textit{OLS} & \textit{OLS} & \textit{OLS} & \textit{OLS} & \textit{OLS} & \textit{OLS} & \textit{OLS} \\
\hline
\textit{Experimental Conditions} & & & & & & & & \\
\text{High Disgust} & -0.18 & -0.70 & 0.02 & -0.08 & 0.09 & 0.17 & 0.01 & -0.08 \\
 & (.13) & (.53) & (.08) & (.32) & (.07) & (.31) & (.08) & (.31) \\
\text{High Anxiety} & 0.18 & 0.20 & 0.04 & 0.05 & -0.01 & 0.00 & 0.09 & 0.11 \\
 & (.13) & (.13) & (.08) & (.08) & (.07) & (.08) & (.08) & (.07) \\
\hline
\text{Disgust Sensitivity} & 0.22 *** & 0.21 *** & 0.12 ** & 0.23 *** \\
 & (.08) & (.05) & (.04) & (.04) \\
\text{Disgust Sensitivity} \times \text{High Disgust} & 0.11 & 0.02 & -0.02 & 0.02 \\
 & (.11) & (.06) & (.06) & (.06) \\
\hline
\textit{Sample} & & & & & & & & \\
\text{MTurk} & -0.46 ** & -0.49 ** & 0.14 & 0.12 & 0.13 & 0.11 & -0.33 *** & -0.36 *** \\
 & (.15) & (.14) & (.09) & (.09) & (.09) & (.09) & (.09) & (.08) \\
\text{Staff} & -0.05 & -0.16 & 0.05 & -0.03 & 0.16 & 0.12 & -0.13 & -0.22 + \\
 & (.21) & (.20) & (.13) & (.12) & (.12) & (.12) & (.12) & (.12) \\
\text{Intercept} & 4.82 *** & 3.76 *** & 3.15 *** & 2.14 *** & -0.14 & -0.73 ** & 0.16 + & -0.93 *** \\
 & (.16) & (.39) & (.10) & (.24) & (.09) & (.23) & (.09) & (.23) \\
\hline
\textbf{Observations} & 536 & 536 & 536 & 536 & 536 & 536 & 536 & 536 \\
\end{tabular}
\end{table}

Note: Standard errors in parentheses. \textit{+} $p < .10$, \textit{*} $p < .05$, \textit{**} $p < .01$, \textit{***} $p < .001$. Policy measures support for exclusionary policies. Avoidance measures behavioral intentions, such as avoiding travel. Health measures behavioral intentions such as exercise. Cleansing measures behavioral intentions such as hand-washing.
As shown in the first column of Table 1, neither condition significantly affected support for exclusionary policies. Thus, we find no support for H2 or H4. However, we also expected that individuals higher in disgust sensitivity would be more supportive of exclusionary policies (H3) and that they would be more responsive to the disgust manipulation (H5). To test these hypotheses, we added a control for disgust sensitivity and an interaction between disgust sensitivity and the High Disgust condition. As shown in the second column of Table 1, disgust sensitivity predicts greater support for exclusionary policies ($p < .01$). The coefficient on the interaction term is positive, as expected, but does not reach statistical significance ($p = .31$). We find substantively similar patterns of results for behavioral intentions, which include avoidant behavior, cleansing behavior, and general health behavior (shown in columns 3-8 in Table 1). None of the experimental conditions affected these behavioral intentions, however, disgust sensitivity was a strong predictor of each.\textsuperscript{12} Overall, there is no evidence that manipulated disgust or anxiety influences policy attitudes, but there is strong evidence that disgust sensitivity predicts greater support for exclusionary attitudes and behavioral intentions.\textsuperscript{13}

\textsuperscript{12} The main effects of disgust sensitivity on behavioral intentions are robust to the inclusion of controls for demographics and political identity (see Table A3 in the Appendix).

\textsuperscript{13} One possible reason for the null result between manipulated disgust and exclusionary policy preferences was the absence of any direct person-to-person transmission in the case of Chikungunya. Depending on the nature of the policy solutions (e.g., the perceived riskiness of a policy or the degree to which it is exclusionary versus protective), there also might be more differentiation in the effects of anxiety and disgust on policy preferences.
Knowledge of Chikungunya

According to our sixth hypothesis, induced disgust should increase the retention of information related to the eliciting object (H6). We tested this hypothesis by comparing performance on knowledge questions across conditions. As described earlier, participants were given a battery of questions that tested their recall of Chikungunya facts. Because results do not differ across the specific knowledge items, we combine them into an additive index of knowledge about Chikungunya (ranging from zero to three answers correct). Sixty-one percent of subjects got three questions right and 30% got two of three correct, indicating high levels of learning. We predict knowledge using an ordered logit model with condition and sample dummies, similar to the models above (see Table 2). The coefficients for both the High Disgust and High Anxiety conditions are positive, but neither reach statistical significance (\( p = .49, p = .45 \), respectively). Thus, there is limited support for our sixth hypothesis.

Information Search

While neither condition had apparent effects on retention of the information provided to them, the stimulus may have affected willingness to seek out additional information. Previous research indicates that anxiety should increase information seeking, while the existing literature on disgust suggests the opposite pattern (i.e., that induced disgust should cause a person to disengage with the eliciting object). To test our expectations, students and staff were both asked whether they would like us to email them more information about the disease, while MTurk subjects were asked how likely it is that they would look up more information.

Levels of information search are shown across experimental condition in Figure 2. Given the differences in question wording, we analyze the results separately for the lab and online samples. For lab participants (students and adults), we predict information search using a logit
model with *High Anxiety* and *High Disgust* indicators as independent variables. For MTurk subjects, we use an ordered logit model. Both sets of results are shown in Table 2 and we rely on these models for tests of statistical significance discussed below.

We begin by examining information search among the lab samples, shown in the left-most panel of Figure 2. In the *Low Anxiety, Low Disgust* condition, 27% of participants requested more information. Moving over to the next panel, that rate dropped to 21% among those in *Low Anxiety, High Disgust* condition. A similar pattern is observed across the *High Anxiety* conditions. More than half (52%) of those in the *High Anxiety, Low Disgust* condition requested additional information about Chikungunya. The corresponding percentage for subjects in the *High Anxiety, High Disgust* group was 35%. As expected, subjects in the *High Anxiety* condition were significantly more likely to request information (*p* = .002), while subjects in the *High Disgust* condition were significantly less likely to request more information (*p* = .038).14

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14 We do not find a statistically significant interaction between disgust sensitivity and the disgust treatment.
Results for the MTurk sample are displayed in the right-most panels of Figure 2. Overall, information seeking was low, with 51% of subjects saying they were “not too likely” or “not likely at all” to look up additional information about Chikungunya. The High Anxiety condition again predicts greater information search, though the effect is weaker ($p = .06$). The High Disgust condition predicts a lower likelihood of information search, but this effect falls short of statistical significance ($p = .34$). Across all three samples, we find consistent evidence that anxiety increases information search, while disgust actually decreases the desire for more information.
Conclusion

In the past several decades, there has been an explosion in research on the impact of emotion on attitudes and behavior (e.g., Redlawsk 2006; Crigler et al. 2007). Yet the effects of discrete emotions “are not simply a matter of individual psychology…They also depend on larger forces at work within politics and the media” (Huddy 2004, 802-3; emphasis added). The manner in which issues are framed, argued, and debated can trigger emotions that influence everything from how people process information to their proclivity for political action. In the present study, our interest was the distinct emotions elicited by news coverage of infectious disease. Research in political science has tended to focus on the effects of anxiety or fear (e.g., Albertson and Gadarian 2014; 2015), yet media portrayals of public health crises may also elicit disgust—an emotion that has particular relevance given its purpose of detecting and avoiding
disease (Schaller and Park 2011). Both anxiety and disgust are likely to play a role in public
health crises. Yet there has been little investigation of whether the two emotions have different
downstream consequences for information processing.

In an experiment that independently manipulated anxiety and disgust about an actual
infectious disease, we found little evidence that induced disgust or anxiety influenced policy
preferences or behavioral intentions. Our scenario may not have posed a sufficient threat to
generate powerful reactions, a suspicion that is supported by the absence of an experimental
effect on self-reported anxiety. Additionally, had we provided a stronger out-group cue, as was
present with the Ebola outbreak, we might have found stronger effects on exclusionary attitudes.

We were also unable to separate the anticipated effects of anxiety and disgust on policy attitudes,
as our policy outcomes represented both exclusionary and protective policies. For some public
health threats, policy solutions like vaccination are available that serve a protective, but not
exclusionary function. In cases such as these, we would expect greater differentiation in the
effects of anxiety and disgust.

While there was no evidence that the experimental manipulation affected how much
information subjects retained, we found distinct effects on the desire to seek out more
information about the disease. Anxiety increased information search (consistent with past
research), while disgust decreased information search. This suggests that both emotions orient
our attention to the eliciting object, but that only anxiety prompts continued effort to understand
and resolve a threat. Disgust, in contrast, causes a person to avoid the issue. Taken together, our
results raise difficult questions about how to communicate information about public health
threats to mass public. Insofar as certain topics (e.g., symptoms of a disease, its method of
transmission) induce a disgust reaction, the public may disengage from media coverage and fail
to acquire important public health information. Anxiety was shown to have the opposite effect (i.e., it stimulated information seeking), but the benefits might be offset if anxious people pay disproportionate attention to threatening information or support policies that weaken civil liberties (Albertson and Gadarian 2014; 2015).

Our research examines public reactions to just one health threat and two variations in how the disease is presented. Yet, health threats likely vary along a number of dimensions, such as the symptoms of a disease, its origin, communicability, and magnitude of spread, each of which might influence the particular emotions incited among the public. Greater attention to the nature of this influence is essential for understanding of how the public responds to health threats and the most effective way to inform people in a time of crisis.
References


Appendix

Low Disgust, Low Fear

Now we'd like to ask you some questions about a new public health issue, but first we'd like to give you a little background

Health officials in the United States are preparing for the influx of the Chikungunya disease that has been rapidly spreading in the Caribbean, and has recently made its way to the U.S. Chikungunya is characterized by a fever, rash, and excruciating joint pain. In Haiti, it is known as the “breaking bone” disease, because victims feel as if their bones are breaking. These horrific symptoms typically last a week, but have been known to persist for years, sometimes even causing chronic arthritis. Chikungunya can also cause nausea and vomiting, and inflammation of the eyes. Currently, there is no vaccine or treatment for the disease.

The disease is contracted through mosquito bites, making it difficult to contain in tropical climates, but less of a threat in the United States. The virus is spread by mosquitoes that do not survive in colder climates. Thus the vast majority of instances of the disease in the U.S. are cases that were contracted abroad. Nevertheless, experts recommend taking standard precautions to avoid mosquito bites.

High Disgust, Low Fear

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Low Disgust, High Fear

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The disease can be contracted through a single mosquito bite, making it extremely difficult to contain. The virus is spread by day-biting mosquitoes which makes it difficult to use chemical control measures. Prior to 2014, Chikungunya was rare in the U.S. However, the Centers for Disease Control has confirmed 39 cases since June, including cases in Tennessee, Georgia, Florida, Rhode Island, and Minnesota.

High Disgust, High Fear

Now we'd like to ask you some questions about a new public health issue, but first we'd like to give you a little background.

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### Table A1. Factor Analysis of Emotional Responses to Chikungunya

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*Note: Columns display factor loadings submitted to promax rotation. Factor loadings > 0.4 are shown in bold.*

### Table A2. Emotional Responses by Experimental Condition

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*Note: Cell entries display mean emotion ratings ranging from 0 (not at all) to 4 (extremely well). Standard errors are in parentheses.*
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**Sample**

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**Observations**

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**Note:** Standard errors in parentheses.  + p < .10, * p < .05, ** p < .01, *** p < .001.