Title

Emotional Reactions to COVID-19 Projections and Consequences for Protective Policies and Personal Behavior

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Abstract: How does the public react to information about the likely progression of COVID-19 cases in the United States? How do these reactions vary over the course of the pandemic and by partisanship, and with what consequences for policy attitudes and personal behavior? We argue that reading projections about the peak of COVID-19 cases in the United States is likely to lead to increased levels of anxiety and sadness. We expect that these effects will be more pronounced and less polarized along partisan lines earlier in the pandemic. Finally, we expect that elevated anxiety and sadness should in turn lead to greater support for protective policies to combat the pandemic and a greater inclination to engage in protective behaviors. To test these arguments, we fielded online survey experiments at three points in time (April, June, and August), in which respondents were randomly assigned to a control group or one of two projections about the likely progression of COVID-19 cases in the United States. Across all three waves, we find that exposure to information about case peaks increases anxiety and sadness, though the effects get weaker over time, particularly among Republicans. We also find that these elevated emotional responses increase support for protective policies and behavior.

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As COVID-19 cases began spreading across the globe, many countries adopted some form of lockdown, closing schools, businesses, entertainment venues, and public spaces. By early April, public health experts were recommending that people wear face coverings when in indoor spaces or outside when closer than 6 feet.[1] These types of measures were widely adopted in many countries to limit the spread of SARS-Cov-2.[2] More broadly, whether it is instituting seat belt laws, campaigns to reduce smoking, or other public health campaigns, public health measures are a consistent part of government policy.

But the effectiveness of any such measure depends on the public's support for and willingness to comply with the policy. If public health measures such as mask mandates are imposed to fight the COVID-19 pandemic but poorly enforced or followed among the public, their effectiveness will be minimal. We have seen this play out quite clearly in the U.S. context, where measures such as mask mandates have become politicized, even though mask use is considered one effective tool to help prevent the spread of COVID-19. It is therefore essential to understand the factors that motivate individuals to engage in protective behaviors and to support protective policies during a public health threat.

Existing scholarship suggests that certain groups, such as Republicans, men and the highly religious are less likely to engage in protective behaviors or to support policies to address the pandemic than women and older individuals (Allcott et al. 2020; Gadarian et al. 2020; Painter and Qiu 2020; Cassino and Besen-Cassino 2020; DeMora et al. 2021; Haischer et al. 2020). It is not entirely clear though what is underlying these associations, or how people are

[1] "How Masks Went from Don't Wear to Must-Have," Wired.

[2] "Italy's harsh lessons help keep second wave at bay," Financial Times.

reacting to the broader information environment about COVID-19, especially with respect to scientific information about the virus.

Drawing from work in social and political psychology, we argue that one key mechanism that leads people to be more likely to engage in protective behaviors and support protective policies is emotional reactions to information about the spread of COVID-19. More specifically, reading scientific information about projections of rising COVID cases should generate feelings of anxiety and sadness, emotions that incline people toward protective behaviors (Albertson and Gadarian 2015; Coan et al. 2020). We also contend that this type of information should generate stronger emotional reactions early in the pandemic given higher levels of uncertainty about the virus. Finally, we consider how exposure to such information interacts with partisanship. Democrats and Republicans may react differently to reading scientific information about the pandemic, especially at later time points as the pandemic became increasingly politicized (Albertson and Gadarian 2015).

We test these expectations using original survey experiments fielded in April, June, and August of 2020. Because the scope of the COVID-19 crisis and how it would unfold over the coming months was uncertain, we embedded an experiment in which respondents were randomly assigned to a control group or treatments highlighting projections of the likely peak in cases. We find exposure to scientific projections about rising COVID cases increases feelings of anxiety and sadness, most strongly earlier in the pandemic. While partisans have similar emotional reactions early in the pandemic, Republicans become less affected by information later in the pandemic. These emotional reactions are consequential. Elevated feelings of anxiety and sadness lead to a greater intention to engage in behaviors and support policies aimed at mitigating the pandemic. These findings shed light on the conditions under which publics will be more inclined

to comply with public health measures and add to the large body of literature showing that different emotional reactions to the information environment can affect political attitudes and behavior in distinct ways.

Existing Understandings of Public Support for Protective Behaviors and Policies

Existing research has explored characteristics that are associated with engaging in protective behaviors like mask wearing during the pandemic or supporting policies to combat it. Men are less likely to wear a mask or support protective policies to deal with COVID-19 compared to women (Cassino and Besen-Cassino 2020). White evangelicals also show less support for wearing masks and a majority does not support mask mandates (DeMora et al. 2021).

One of the biggest differences to emerge with respect to support for protective behaviors and policies has been with respect to partisanship. Republicans downplay the threat of COVID-19, are less worried about contracting COVID-19, are less likely to engage in protective behaviors, and are less likely to think that protective behaviors like mask wearing and social distancing are effective (Allcott et al. 2020; Gadarian et al. 2020). These patterns have also been observed with behavioral data. Areas with more Republicans exhibit lower levels of social distancing compared to areas with more Democrats (Allcott et al. 2020), and Democrats are more likely to comply with stay at home orders and engage in social distancing behaviors (Grossman et al. 2020; Painter and Qiu 2020).

Partisanship has been shown to not only be associated with levels of concern and protective behavior but also with support for policies to address the pandemic. Democrats have been more supportive of government providing free COVID-testing and treatment, supporting

workers, and closing schools and public events (Gadarian et al. 2021), as well as vote-by-mail policies during the 2020 election (Lockhart et al. 2020). However, it is not always clear from existing scholarship what is underlying these associations, and most of these studies do not examine the ways in which these groups are reacting to particular features of the information environment around COVID-19.[3]

Existing scholarship on prior public health threats suggests that "the way a new health issue emerges into media discourse has consequences for the public's response, likely for the long term" (Gollust, Nagler, and Fowler 2020, p. 968). This is particularly important for public health threats that are novel, as in the coronavirus, where individuals will be looking for information to understand the threat (Hart et al. 2020). Public health communication is likely to be more effective when messaging is uniform among scientific and political elites (Gollust, Nagler and Fowler 2020). When health threats become politicized and polarized, as in the case of the COVID-19 pandemic, individuals are more likely to evaluate information about the issue through a partisan lens (Albertson and Gadarian 2015; Fowler and Gollust 2015), which can have consequences for policy support.

Some existing work on COVID-19 has looked at communication in the media and possible effects on public attitudes. Coverage in mainstream press outlets early in the pandemic became increasingly politicized over time, with more coverage of political elites in news articles than of scientists, while politicization was lower in network news (Hart et al. 2020; Sol et al. 2020). Right-leaning news sources were more likely to disseminate misinformation about COVID-19, and individuals who reported consuming such information were more likely to

[3] Scholars have also explored how other attitudinal dispositions influence support for protective behaviors and protective policies (see for example Djupe and Burge 2020; Reny 2020; and Reny and Barreto 2020).

believe misinformation (Motta, Stecula and Farhart 2020), while individuals who reported consuming mainstream media had more correct perceptions about COVID-19 and infection prevention (Jamieson and Albarracin 2020). The politicization and polarization of media coverage of COVID-19 likely undergirds the resistance of some members of the public to protective behaviors and policies (Hart et al. 2020).

But, how might information increase the likelihood of engaging in protective behaviors? Encouragement from political elites and scientists is one important tool to encourage such behaviors. Grossman et al. (2020) found that governors' communications encouraging protective behaviors decreased citizen mobility even before the issuance of stay-at-home orders and was more effective in Democratic-leaning counties. Less work has examined the effects of the presentation of scientific information related to COVID-19. This is an important area to consider, especially given that the public is most likely to trust information coming from scientists during a pandemic, given their high levels of expertise (Albertson and Gadarian 2015). Here, we explore how the public reacts to scientific information about the projected peak in COVID-19 cases, which were rising at the time of our studies, and were widely reported in the news. More specifically, we explore how the public reacts emotionally to such information, since emotional reactions play an important role in motivating protective behavior during times of threat, including public health threats (Albertson and Gadarian 2015; Brader 2006; Marcus et al. 2000; Merolla and Zechmeister 2009). As we elaborate on in the next section, we consider how these reactions vary over time and by party identification, and with what consequences for behavior and attitudes.

Threats, Emotional Reactions and Policy Preferences

Over the last several decades, scholars have demonstrated that when threats are salient in the political information environment, they evoke a range of negative emotions (Brader 2006; Conover and Feldman 1986; Marcus et al. 2000; Merolla and Zechmeister 2018). The particular negative emotions experienced, and the degree to which they are experienced, depends on the nature of the threat, the way information about the threat is conveyed to the public, and characteristics of the individual. Negative emotions that individuals experience can influence the types of policies that they support to address the threat, including protective policies.

One framework that is useful for understanding the mix of emotions that individuals may experience when threat is salient in the political environment is cognitive appraisal theory. This theory considers how emotions are expressed, considered, and ultimately influence evaluations and behavior depending on how people appraise their environment along multiple dimensions, including: "certainty, pleasantness, attentional activity, control, anticipated effort, and responsibility" (Lerner and Keltner 2006, p. 117; also see Lazarus 1991 and Smith and Ellsworth 1985). A context of threat that broadly affects the polity is likely to be unpleasant, caused by something outside of the individual, and involve a high degree of effort to deal with the situation, which can lead to a range of negative emotions, such as fear, anger, sadness, and disgust (Smith and Ellsworth 1985).

Which of these emotions is more dominant will depend on secondary appraisals.[4] Individuals are more likely to experience anxiety/fear when an unpleasant context is higher in uncertainty, where they feel little control, where their attention is more attuned to the stimulus,

[4] As Albertson and Gadarian (2015, p. 7-8) write: "this appraisal process does not need to occur consciously..."

and where they are not necessarily sure where to place blame for the situation (Carver 2004; Harmon-Jones et al. 2009; Lazarus 1991; Lerner and Keltner 2000, Lerner and Tiedens 2006; Smith and Ellsworth 1985). Those who experience similar appraisals of high uncertainty, feel like a situation is uncontrollable and the result of situational factors, but are not personally threatened and want to divert their attention away from the threat, may be more likely to experience sadness, an emotion linked to loss, in particular the death of a loved one or events that have already occurred (Small and Lerner 2008; Smith and Ellsworth 1985). Individuals are instead more likely to experience anger when their sense of an unpleasant environment is associated with less uncertainty, a sense that someone or something is to blame for the unpleasant situation, where they are attuned to the threat, and where they feel like they have greater control (Carver 2004; Harmon-Jones et al. 2009; Lazarus 1991; Lerner and Keltner 2000, Lerner and Tiedens 2006). The appraisals associated with disgust are similar, though individuals are more likely to experience disgust when they want to divert their attention away from the threat (Smith and Ellsworth 1985), which is more likely when they face a threat that may be a contaminant (Kam and Estes 2016).

In applying this theory to the early period of a public health threat, all four of these emotions may be relevant. Member of the public who experience a great deal of uncertainty, feel like they have little control, and aren't clear who to blame (since the main culprit is a pathogen), are likely to experience elevated anxiety and fear, especially if their attention is tuned into the threat (Albertson and Gadarian 2015). Studies of other health threats have found elevated levels of anxiety in reaction to such threats (Albertson and Gadarian 2015), including with respect to COVID-19 (Gadarian et al. 2021; Reny and Barreto 2020). Others with these types of appraisals, who may not feel personally threatened, who may blame external factors, and think of those who

have lost their lives to COVID, may experience sadness. Individuals may also experience disgust, if they are motivated to avoid pathogens that may lead to contamination (Aaroe et al. 2016; Clifford and Piston 2017; Kam and Estes 2016), and place blame for the threat on others. There is a long history of othering and blame during public health threats (Dionne and Turkmen 2020), and some of those dynamics have been present with respect to COVID-19 and treatment of Asians (Chan, Kim and Leung 2020; Green et al. 2020; Reny and Barreto 2020). To the extent that people are inclined to stay focused on the threat, blame others for it, and feel like they have control of the situation, they may be more inclined to experience feelings of anger.

While we might expect to observe a range of elevated negative emotions when a public health threat is salient in the information environment, which emotions individuals experience will depend on how information about the threat is presented to the public. If the information conveys a sense of uncertainty or lack of control over the situation, individuals should be more likely to experience fear or sadness. If the information focuses on deaths, sadness may be the more dominant emotion of the two. On the other hand, if the presentation of information focuses more on symptoms people experience, especially those related to bodily fluids, individuals should be more inclined to experience disgust (Kam and Estes 2016). The information we focus on is scientific projections about COVID-19. There is always uncertainty when dealing with future projections, and since this is information about projected case counts, rather than symptoms, and it does not place blame on any groups, we expect individuals will be more inclined to experience greater fear and sadness. They should not be inclined to experience greater disgust or anger. This produces the following hypotheses.

Hypothesis 1: Respondents exposed to COVID-19 projections will feel higher levels of fear/anxiety than respondents not exposed to COVID-19 projections.

Hypothesis 2: Respondents exposed to COVID-19 projections will feel higher levels of sadness than respondents not exposed to COVID-19 projections.

The degree to which individuals react emotionally may also vary over time and depending on the predictions themselves. Emotional reactions to reading about COVID-projections should be greater earlier in the pandemic. First, levels of uncertainty were much higher earlier in the pandemic, and individuals likely felt lower levels of control, since it was not entirely clear how to best prevent the spread of COVID-19. Furthermore, the information environment early in the pandemic was less polarized and less politicized, so individuals would have fewer incentives to discount scientific information.[5] We should therefore see a stronger impact of the treatments on emotional reactions in the April wave, and this should diminish in subsequent waves.

Hypothesis 3 (Timing): Emotional reactions to COVID-19 projections should be higher earlier in the pandemic.

Emotional reactions may also be more intense depending on when cases are expected to peak. At the time we were designing our study, some scientific models predicted that COVID-19 cases would peak in the spring of 2020, while others predicted that cases would peak in fall of 2020. If individuals believe they are currently close to the peak, they may feel less anxious and less sad, compared to if they think the worst is still yet to come. This leads to the following expectations:

Hypothesis 4 (Peak Prediction): Emotional reactions to COVID-19 projections should be higher for later peak predictions (fall) compared to earlier peak predictions (spring).

Emotional reactions to information about a public health threat may also depend on individual characteristics. A long line of scholarship has argued and found that individuals use

[5] It is also possible that respondents became numb to case counts and fatalities over time. While not part of our a priori theorizing, we thank an anonymous reviewer for pointing this out.

partisanship to process incoming information, form attitudes, and guide evaluations of political objects (Campbell et al. 1960; Zaller 1992), and this has only intensified in an era of high polarization (Mason 2018). Republicans are less worried about COVID-19 (Gadarian et al. 2021), but might this condition how they react to scientific projections?

We draw from work by Albertson and Gadarian (2015) to develop expectations for whether partisanship will moderate the effect of exposure to information about scientific projections. They argue (p. 15): "Some threats are not heavily debated. In some situations, everyone experiences anxiety, and political elites agree on a solution." They label these types of threats unframed threats, and here we would expect individuals to react similarly regardless of partisanship. However, they argue that other threats in politics are more nuanced, and political elites may disagree with whether a threat exists, the source of the threat, and possible solutions to the threat. In short (p. 23), "With framed threats, we differ in terms of the things that make us anxious…partisanship is a key variable that shapes whether a framed threat elicits anxiety." Finally, they note that whether a threat is unframed or framed can shift over time.

Applying this to the context we explore, early in the pandemic, when the threat was less politicized, we may see similar emotional reactions among Democrats and Republicans, since both are tuned into scientific information and have little reason to resist it. As the pandemic became increasingly politicized over time, particularly among Republican elites and the media, we may observe resistance to scientific information among Republicans but not among Democrats. This reasoning leads us to the following hypothesis:

Hypothesis 5: As the pandemic progresses, negative emotional reactions among Republicans will diminish.

The emotional reactions individuals experience has consequences for policy preferences to deal with the threat and may impact their own behavior. When individuals feel a greater degree of uncertainty and lack of control over a situation, as in the case of anxiety, they are more likely to pay attention to and carefully process information related to the threat (Marcus, Neuman, and MacKuen 2000). They also have a greater desire for protection (Jarymowicz and Bar-Tal 2006) and are more likely to engage in defensive behavior (Frijda 1987; Marcus et al. 2000; Steimer 2002). According to Albertson and Gadarian (2015), these motivations should also translate into greater support for policies that provide protection from the threat. Scholars have found this to be the case for those experiencing anxiety in relation to a number of policy domains, such as terrorism (Albertson and Gadarian 2015; Huddy et al. 2007; Fisk, Merolla and Ramos 2019), climate change (Albertson and Gadarian 2015), and public health threats (Albertson and Gadarian 2015), including COVID-19 (Reny and Barreto 2020).

We expect to observe a similar relationship with respect to reading about scientific projections related to COVID-19. Those who come to experience greater anxiety should be more supportive of policies aimed at mitigating the threat. We also expect that this will translate into personal behavior, with those anxious being more likely to engage in protective behaviors like wearing a mask and social distancing.

Existing work has not considered how feelings of sadness translate into policy attitudes related to a public health threat. We expect sadness, like anxiety, to lead to a preference for protective behaviors and policy in the context of COVID-19. First, according to Small and Lerner (2008, 153): "sadness is associated with relatively less certainty and thus gives people the meta-level sense that they should carefully examine information before forming a judgment." In this sense, sadness is similar to anxiety. If individuals are motivated to engage in higher

cognitive effort around COVID-19 cases, then they should be more open to scientific recommendations to engage in protective behaviors, like mask wearing and social distancing, as well as support policy efforts to address the threat.

Another possible mechanism is that when individuals feel sad, they are motivated to change their circumstances (Lerner et al. 2004) and repair their mood (Garg and Lerner 2013; Lerner et al. 2004; Raghunathan and Pham 1999). For example, sad individuals are more likely to engage in reward-seeking behaviors (Dorison et al. 2020; Garg and Lerner 2013; Lerner et al. 2004; Raghunathan and Pham 1999) and pro-social behaviors (Forgas, 1991), and more so than those experiencing anxiety (Dorison et al. 2020; Raghunathan and Pham 1999). Engaging in protective behaviors and supporting protective governmental policies in the context of COVID-19 could serve the dual goals of changing circumstances and making people feel better. With respect to the first, engaging in protective behaviors and supporting protective policies should reduce the transmission rates of COVID-19 and hence one's personal risk of contracting COVID-19. With respect to the second, much of the messaging behind mask use and social distancing was a pro-social argument to protect one's neighbors; hence, individuals might feel better by engaging in prosocial behaviors and supporting prosocial policies that should diminish community spread.

To summarize, we hypothesize the following:

Hypothesis 6a: Those experiencing elevated fear/anxiety from reading scientific projections should be more inclined to support behaviors and policies that provide protection.

Hypothesis 6b: Those experiencing elevated sadness from reading scientific projections should be more inclined to support behaviors and policies that provide protection.

Preregistration of Related Hypotheses in COVID-19 Projections Research Program.

We want to be clear that we did not preregister Hypotheses 1-6. However, we did preregister predictions closely related to these hypotheses as part of a larger research program on the impact of COVID-19 projections on Americans' political views that relied upon the same experimental treatment implemented through the same three-wave survey. They were simply focused on a different, though related, dependent variable that was the most pressing subject of study at the time: whether to conduct the November 2020 election in person or whether to permit voters to cast their ballots through the mail. Our preregistrations of hypotheses for two analyses through the EGAP Registry at [links suppressed to preserve anonymity] set forth the expectation that treating respondents with predictions for either spring or fall peaks in COVID-19 case rates, relative to a control group, should lead to more support for election policies that provide protection from the health threat ("For all of the questions in the voting battery, we expect that exposure to both treatments will make voters more supportive of voting by mail options for themselves and others (and thus less supportive of in-person voting options), by bringing COVID-19 concerns to the top of their minds") and that this impact of the treatment will vary by partisanship ("By interacting our randomized survey treatments with political variables, we will test the hypothesis that Republican voters and Trump supporters are influenced less by the treatments. Because prior work has shown that these types of respondents are less concerned about COVID-19 and that they are less trusting of scientific efforts, the impact of our expert COVID-19 projections should be attenuated for them." We have published analyses focused on the impact of this informational treatment on how elections should be run (-------, 2021) and on how these impacts vary by party (-------, 2022). Our initial survey design did include all of the questions that we analyze in this manuscript on emotions on COVID-19 protection policies, but

due to time constraints as we worked to get the first wave of the survey into the field in early April, 2020, we preregistered only the hypotheses focused on in-person voting.

Design

We fielded three original online surveys using Luc.Id's Fulcrum platform. The sampling frame was American citizens of voting age. This platform has been demonstrated to provide nationally diverse samples that exhibit similar treatment effects to samples from other sources (Coppock and McClellan 2019). Table 1 shows the number of respondents by partisanship for the three surveys.

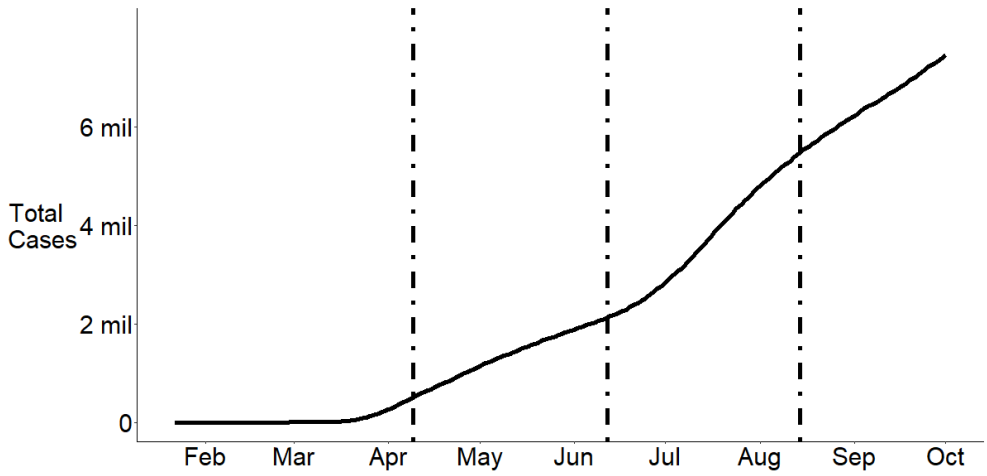
Table 1: Respondent Counts by Partisanship

	Total	Republicans	Democrats	Independents
April	5,610	2,203	2,565	842
June	5,773	2,433	2,480	860
August	5,606	2,229	2,558	819

Study 1 was fielded early in the pandemic, April 8-10th, with 5, 610 respondents. Study 2 was fielded two months later, from June 11-13th, with 5,773 respondents. Study 3 was fielded in August 13-16th, with 5,606 respondents, at a point when news coverage of the pandemic had become even further politicized (See Hart et al. 2020). Figure 1 shows the timing of the surveys relative to case counts[6] in the United States.

Figure 1: Survey Waves and COVID Cases

[6] Case counts are from the CDC page "United States COVID-19 Cases and Deaths by State over Time."



After consenting into the study, participants answered questions related to political predispositions and interest in the upcoming election.[7] To refresh, our main goal was to expose participants to scientific information about the projection of future COVID-19 cases, examine how that information impacts emotional responses, and in turn future behavior and policy preferences. Respondents in the April and June surveys were then randomly assigned to either a control group that did not receive any information or one of two treatment groups that received truthful summaries of the projections of a team of scientists about the Covid-19 outbreak. One of the treatments predicted a peak in the spring and was based on modeling by scientists at the University of Washington,[8] while the other treatment predicted a peak in the fall and was based on modeling by scientists at Imperial College.[9] These different predictions enabled us to vary the projected peak in cases, while avoiding deception. It also enables us to explore if individuals are more responsive to a future peak (H4). Since these were actual predictions referenced in media,

[7] This study was reviewed by the institutional review board at an author's affiliated university and deemed exempt as it met the criteria for minimal risk and participants were debriefed at the end.

[8] Data available at https://covid19.healthdata.org/united-states-of-america.

[9] N. Ferguson et al., "Report 9: Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand."

it also lends higher external validity to our design. The short text for each treatment was as follows:

> Spring Peak: While no one can be certain how the COVID-19 outbreak will progress in the United States, one well-respected team of scientists at a leading university has projected that if social distancing measures are widely adopted, the effects of the virus will [reach/have reached] their peak in April, then gradually decline throughout the spring and into the summer.
>
> Fall Peak: While no one can be certain how the COVID-19 outbreak will progress in the United States, one well-respected team of scientists at a leading university has projected that if social distancing measures are widely adopted now but are lifted during the early fall, a new surge in cases will come and the effects of the virus will reach their peak in November or December.

We did not identify the source of the projections to hold the source constant. It no longer made sense to include the spring peak condition in our August study, so we instead only included a control group and a fall peak. To test the robustness of the treatments to alternative presentations, we also adapted the text slightly and added an illustration to accompany the text which showed the projected peak:

> While no one can be certain how the COVID-19 outbreak will progress in the United States, one well-respected team of scientists at a leading university has projected that infections, hospitalizations, and deaths will continue to grow through the fall and that deaths in the United States may total more than 250,000 by November 1st. Below is an illustration of their projections:

Respondents were evenly balanced across experimental conditions on a host of demographic and attitudinal measures (see Tables A1 and A2). Following exposure to the

treatments, we asked respondents in the treated groups to recall when the effect of the virus that caused COVID-19 will reach or have reached their peak. To maximize compliance, we gave respondents the opportunity to return to the article. Table 2 shows compliance rate by respondent partisanship.[10]

Table 2: Compliance Rates in Total and by Respondent Partisanship

		Total	Republicans	Democrats	Independents
April Wave	Fall Peak	48	45	48	53
	Spring Peak	71	71	73	65
June Wave	Fall Peak	67	62	69	74
	Spring Peak	52	50	54	51

In general, the low compliance rates suggest that the treatment may have been most effective in making the virus and case counts salient, but that respondents may not have accurately updated their beliefs to reflect the information presented to them. If inattention is a problem, we would expect this to attenuate the effects observed, especially between the fall and spring peak treatments. However as there are no large differences between partisans, this is unlikely to drive differential treatment effects across these groups. Given these varied compliance rates, in the findings section we examine the treatments both pooled and separated.

To capture emotional reactions, respondents were then asked to indicate the extent to which they are feeling a range of emotions on a five-point scale, from very slightly or not at all (1) to extremely (5). Emotions with multiple component emotions (fear, anger, optimism) were put in an additive measure and rescaled from 1 to 5. To capture fear, we asked respondents the extent to which they are feeling afraid, anxious, and worried. The emotions to capture anger were contempt, bitterness and resentful, and we again create an additive scale. We asked about

[10] The August wave did not have a compliance measure.

feelings of being enthusiastic, proud, and hopeful to capture optimism, again creating an additive scale. All of these questions are based off of the PANAS battery (Watson, Clark, and Tellegen 1988), and are those recommended by scholars to measure the constructs of fear, anger, and optimism (Neuman et al. 2007). In the three surveys we also had respondents indicate if they were feeling sad. Finally, for the June and August waves, we also added indicators to capture disgust, measured as grossed out and repulsed. Cronbach's alphas for the emotions measured using additive scales are shown in Table 3.

Table 3: Cronbach's Alphas for Emotions Measured using Additive Scales

	April Wave	June Wave	August Wave
Fear	0.90	0.89	0.90
Anger	0.86	0.86	0.87
Disgust	--	0.89	0.90
Optimism	0.77	0.80	0.81

The Effect of Scientific Projections on Emotional Reactions

We explore the main treatment effects on each emotion using OLS models[11]. Table 4 pools the Fall and Spring treatments for the April and June study (there was only a Fall peak condition for August). Table 5 shows the treatment effects for the Fall and Spring conditions separately. For both tables, the control group serves as the baseline and respondents are weighted according to the 2018 American Community Survey.

To refresh, we expect that individuals exposed to scientific projections about COVID-19 are expected to experience increased fear (H1) and sadness (H2), which should be greater earlier in the pandemic (H3) and for the fall peak condition (H4), and these effects may be moderated by

[11] We created survey weights to match the United States citizen voting age population based on the Census' 2018 estimates. Weights are based on gender on its own, the joint distribution of age by education, and joint distribution of race by ethnicity. Bins for the ages of respondents are 18-24, 25-44, 45-64, and 65 and older, and for education they are high school or less, some college, Bachelors, or graduate degree. Bins for race are White, Black, Asian, and Other, and our bins for ethnicity are Hispanic or Not Hispanic.

partisanship as the pandemic progresses (H5). We do not have clear expectations for whether the treatments will increase anger or disgust, given the nature of the treatments. Furthermore, since the information is negative, we may find a reduction in optimism.

Turning first to Table 4, across all three studies exposure to scientific projections about COVID-19 leads to higher levels of fear. The substantive effect is also quite substantial closer to the onset of the pandemic. In April exposure to the scientific projection leads to a one unit increase in fear relative to those in the control group (whose mean is 2.439), while the effect in April and June is more modest (b = 0.363 and b = 0.137, respectively). We see a similar pattern in Table 5. Exposure to both treatment conditions leads to higher levels of fear. As we might expect, fear is slightly higher among those exposed to the Fall peak (April b = 0.368; June b = 0.164), compared to the spring peak (April b = 0.358; June b = 0.110), though these differences are not statistically significant (April p(>F) = 0.7882, June p(>F) = 0.1463).

Table 4: Treatment Effects on Emotions, combined Fall and Spring treatments

		Fear	Optimism	Sadness	Anger	Disgust
April	Treatment	0.363***	-0.181***	0.361***	0.051	
		(0.032)	(0.030)	(0.037)	(0.031)	
	Constant	2.439***	2.804***	2.310***	2.099***	
		(0.026)	(0.024)	(0.030)	(0.025)	
	Observations	5,610	5,610	5,610	5,610	
	R-squared	0.022	0.007	0.017	0.0005	
June	Treatment	0.137***	-0.115***	0.120***	-0.006	-0.143***
		(0.032)	(0.030)	(0.036)	(0.031)	(0.034)
	Constant	2.371***	2.828***	2.291***	2.164***	2.029***
		(0.026)	(0.025)	(0.030)	(0.026)	(0.027)
	Observations	5,606	5,606	5,606	5,606	5,606

	R-squared	0.003	0.003	0.002	0.00001	0.003
August	Treatment	0.093** (0.032)	-0.088** (0.029)	0.120** (0.035)	0.060* (0.031)	0.011 (0.033)
	Constant	2.538** (0.022)	2.787** (0.020)	2.435** (0.025)	2.256** (0.022)	2.042** (0.023)
	Observations	5,773	5,773	5,773	5,773	5,773
	R-squared	0.001	0.002	0.002	0.001	0.00002

Note: *p<0.05; **p<0.01. All dependent variables are measured 1-5.

Table 5: Treatment Effects on Emotions, separated by Fall and Spring treatments

		Fear	Optimism	Sadness	Anger	Disgust
April	Fall Peak	0.368**	-0.173**	0.372**	0.042	
		(0.038)	(0.034)	(0.043)	(0.037)	
	Spring Peak	0.358**	-0.189**	0.351**	0.058	
		(0.037)	(0.034)	(0.042)	(0.036)	
	Constant	2.439**	2.804**	2.310**	2.099**	
		(0.026)	(0.024)	(0.030)	(0.025)	
	Observations	5,610	5,610	5,610	5,610	
	R-squared	0.022	0.007	0.017	0.0005	
June	Fall Peak	0.164**	-0.132**	0.148**	-0.019	-0.160**
		(0.038)	(0.035)	(0.042)	(0.037)	(0.039)
	Spring Peak	0.110**	-0.100**	0.093*	0.005	-0.127
		(0.037)	(0.035)	(0.042)	(0.036)	(0.039)
	Constant	2.371**	2.828**	2.291**	2.164**	2.029**
		(0.026)	(0.025)	(0.030)	(0.026)	(0.027)
	Observations	5,606	5,606	5,606	5,606	5,606
	R-squared	0.004	0.003	0.002	0.0001	0.003

Note: *p<0.05; **p<0.01. All dependent variables are measured 1-5.

In sum, we receive clear support for our first hypothesis that exposure to scientific projections about the likely progression of COVID-19 cases would lead to higher levels of fear, and for our third hypothesis that these effects would be more pronounced early in the pandemic. However, it does not appear that respondents are more responsive to the fall peak (H4), which

could be due to the respondents not paying careful attention to the information in the treatments. These findings are also robust if we add controls (see Tables A3 and A4).

We see a similar set of results when we turn to the emotion of sadness (H2). Across all three studies, exposure to scientific projections significantly increases sadness, by 0.361 units in April, 0.120 in June, and 0.120 in August. The effect again is largest early in the pandemic (H3). Turning to Table 5 for April and June, both the Spring and Fall treatment conditions lead to higher sadness, and there are no significant differences between the two conditions (April $p(>F) = 0.6261$, June $p(>F) = 0.1886$). These results are also robust to the inclusion of controls (see Tables A3 and A4). We find strong support for our second and third hypothesis, but again do not find meaningful differences between the Fall and Spring conditions.

Is it the case that all emotions are elevated by exposure to the treatments? Our theoretical framework suggests this should not be the case. We should not see higher anger and will likely not see higher disgust given the nature of the information provided in our treatments. And, if anything, we should observe lower levels of enthusiasm. As expected, we do not see any consistent increases in anger or disgust and we see a significant decline in optimism across all three study waves.

Does Partisanship Moderate the Effect of the Treatments?

We began by considering the effects of scientific information on the full sample; however, especially in today's polarized political environment, different groups of partisans may react distinctly, especially given the increased polarization around the pandemic over time (H5). To explore whether there are any partisan differences with respect to feelings of fear across survey waves, we added measures of partisanship to the models from Table 4 and add

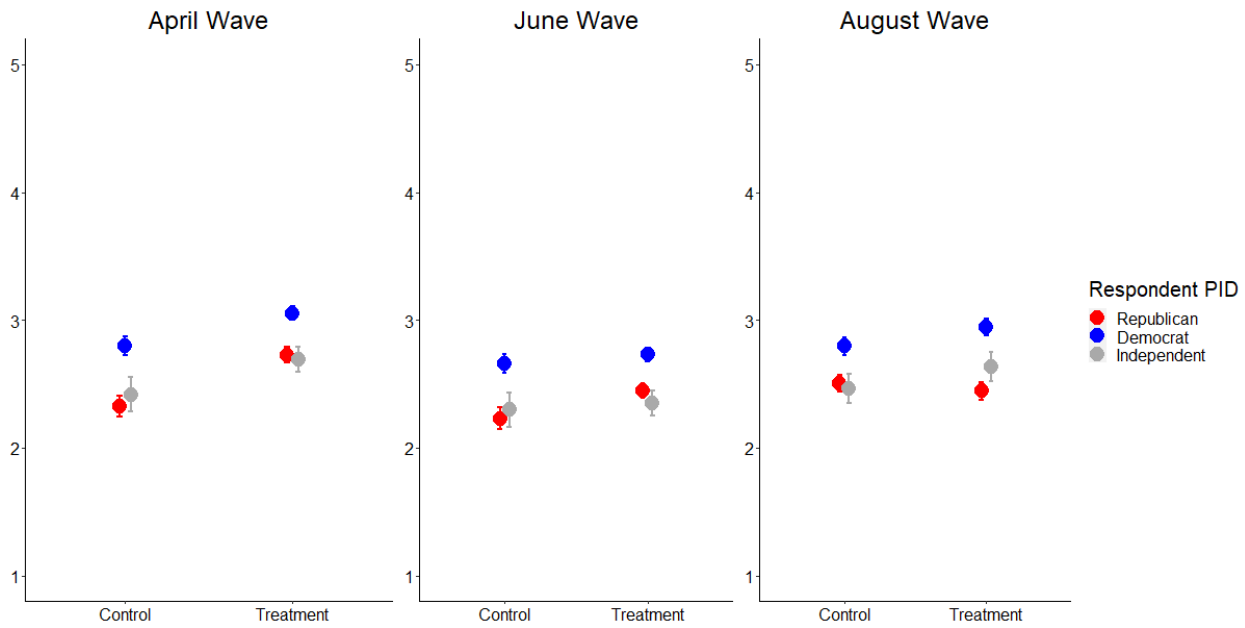
interactions with the treatment conditions. We focus on the pooled treatments since we did not observe any meaningful differences between the Fall or Spring peak conditions in the analyses from Table 5.

Partisanship was coded by asking respondents, "Generally speaking, do you usually think of yourself as a Republican, Democrat, independent, or what?" Respondents that answered "independent" received a follow-up question "Do you think of yourself as closer to the Republican Party or to the Democratic Party?". Respondents who answered neither to the follow-up question were coded as Independents, otherwise respondents were coded as the party to which they consider themselves. Since interaction terms are not directly interpretable, we plot the predicted level of fear from these models across experimental conditions, by party identification in Figure 2 (see Tables A5-A8 for full interaction models with and without controls).

In the April wave, while we observe different baseline levels of fear in the control group across partisans, with Democrats exhibiting more fear than Republicans or Independents, the treatment increases fear across all groups.[12]

Figure 2. Predicted Levels of Fear by Condition and Partisanship

[12] If we look at the models which separate the fall and spring treatments, there is only one case where partisanship moderates the effect of the treatment, for Democrats in the spring peak compared to Republicans (see Table A6). While both groups exposed to the spring peak treatment express higher fear, the effect of the treatment for Republicans is slightly more pronounced than it is for Democrats.



Turning to the June wave, we again observe different baseline levels of fear across partisans in the control group. While the general patterns show higher fear given exposure to the treatment, partisanship moderates the effect of the treatment, such that the effect holds only among Republicans (Tables A5-A8 for full interaction models with and without controls). If we look separately at the Fall and Spring peaks, Democrats in the Fall peak condition also experience increased fear (Table A6). By August, we observe a slightly smaller partisan gap in fear in the control group; however, exposure to scientific information about a peak only increases fear among Democrats and Independents (Tables A5-A8 for full interaction models with and without controls). This is also a point at which the pandemic itself had become further polarized along partisan lines, as Republican elites, particularly Trump increasingly played down the pandemic, holding rallies in which many in attendance would flout recommendations for wearing masks. Therefore, we observe a shift over the course of the pandemic, with Republicans being more affected by scientific projections early on, which makes sense since they started at a lower

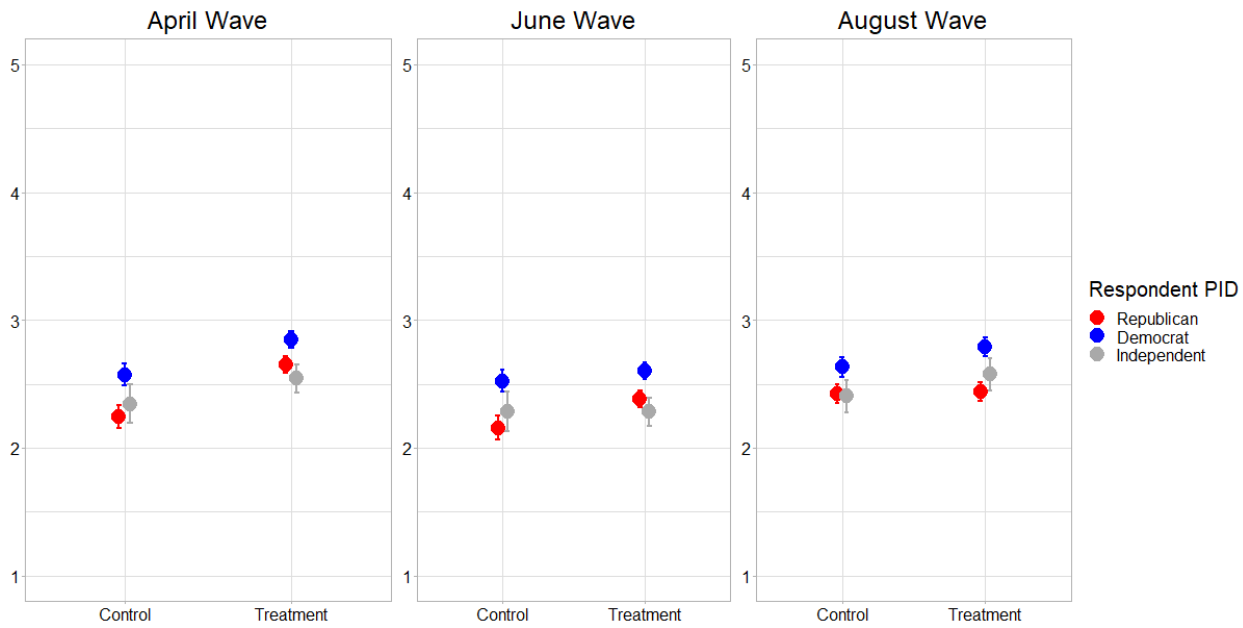
baseline level of fear, to being unaffected by such information as the pandemic became increasingly polarized.

We next turn to the emotion of sadness, shown in Figure 3. In the April wave, we again see differences in sadness among those in the control group, with sadness being highest among Democrats (see Figure 3, Tables A5-A8). Exposure to the treatments leads to similar increases in sadness regardless of partisanship since the interaction terms are not significant.[13] In June, we again see a partisan gap in sadness among those in the control group, and exposure to the treatment leads to higher sadness. However, in this study, the treatment is moderated by partisanship. The effects are such that Republicans experience a bigger increase in sadness than Democrats and Independents (see Tables A5-A8).[14] In August, we see that Republicans no longer react with sadness to reading about scientific projections, though Democrats and Independents react with greater sadness.

Figure 3. Predicted Levels of Sadness by Condition and Partisanship

[13] In the analysis separating the fall and spring peak, the spring treatment is moderated by partisanship for Democrats and Independents (Table A6). All groups experience an increase in sadness given exposure to the spring peak condition, but the increase is more pronounced among Republicans.

[14] In the analysis separating the fall and spring peak, Democrats only experience more sadness in the fall peak condition (see Table A6).



In the interest of space, we do not show the figures for the other emotions. In all of the waves, we find a similar pattern whereby all partisans experience a decline in enthusiasm, as expected (See Figure A1). With respect to anger, Republicans in the April and June surveys experience higher anger relative to their counterparts in the control group (see Figure A2), while in August Democrats experience an increase in anger in reaction to the treatment. The patterns are therefore much less consistent for anger relative to fear, sadness, and enthusiasm. The effects for disgust are also varied, with Democrats and Independents exhibiting lower disgust given exposure to the treatment in June (see Figure A3), and Republicans showing lower disgust given exposure to the treatment in August. To refresh, we did not expect clear effects for disgust given the nature of the information in the treatment conditions, which did not use words or images that would likely trigger that emotion.

How Elevated Anxiety and Sadness Affect Future Intentions and Policy Attitudes

While it is important to understand how the public reacts emotionally to COVID-19 projections in its own right, we are also interested in the consequences of those reactions. As we noted in the theoretical section, we expect that individuals experiencing heightened fear (H6a) and sadness (H6b) in reaction to the treatments should be more supportive of protective behaviors and policies.

To assess whether elevated fear and sadness mediate the relationship between the scientific projections and intention to engage in protective behaviors or support protective policies, we calculate the average causal mediation effect (ACME) using the method by Imai et al. (2010) for the full sample. Causal mediation analysis allows us to look at the impact of emotions that are manipulated by the treatment on potentially interesting outcome variables. In this case, we ask whether the change in emotion induced by the treatment impacts personal protective behavior or policy preferences. This type of modeling works best in experimental contexts where the research directly randomizes treatments that impact the mediating variable, similar to our design (Imai et al. 2010, Bullock et al. 2010). We further report sensitivity analyses of the mediation models in Figures A6 and A7.[15] Since we did not observe differences between the Fall and Spring peaks, we look at the pooled conditions for those waves.

To measure support for protective behaviors, we asked respondents: "to help prevent the spread of COVID-19, how likely are you to do the following activities? Wash your hands regularly, avoid touching your face, avoid gatherings outside of those who live with you, maintain 6 feet away from people outside your household, shelter-in-place, and wear a mask out in public." They responded on a four-point scale from not at all likely to very likely. We created

[15] The sensitivity analyses suggest two minor patterns; that the results for anger and for earlier waves are more robust than those for sadness and in the later waves.

an additive scale across all of these measures, which runs from 0 to 24 (April $\alpha = 0.79$; June $\alpha = 0.8$; August $\alpha = 0.8$).

Table 6 shows the causal mediation analyses, or ACMEs, which represents the indirect effect of the treatment on protective behaviors through the emotion mediators. (In the Appendix, we estimate separate mediation analyses for Republicans and for Democrats, to explore the possibility that the very different elite and social messages that members of each party received at this time about the pandemic impacted the pathway leading from treatment to emotion and finally to personal protective behaviors.[16]) In all cases, elevated fear in reaction to reading about scientific projections increases intentions to engage in protective behaviors. We find a similar pattern for sadness, where increased sadness in reaction to the treatments also leads to higher intention to engage in protective behaviors. The effect for fear and sadness is also larger in the April study compared to the later studies. In sum, we find strong support for H6a, that elevated fear and sadness in reaction to the scientific projections would lead to a greater intention to engage in protective behaviors.[17]

Table 6: Average Causal Mediation Effects of Emotion on Protective Behaviors

	April Wave	June Wave	August Wave
Fear	0.220**	0.103**	0.065*
Sadness	0.093**	0.038**	0.041**

[16] Tables A9 and A10 have the results of the mediation analysis run separately for Republicans and Democrats. Among Republicans, the mediation effects for fear and sadness are not statistically significant for the August wave, which makes sense since the effect of the treatment on these emotions was insignificant for Republicans in that wave. Among Democrats, the mediation effects for fear and sadness are not statistically significant for the June wave, which also is consistent with the lack of a main treatment effect among Democrats in that wave. The mediation effect of sadness is not statistically significant in the August wave.

[17] We do not observe any direct effects of the treatment on intentions to engage in protective behaviors. We also do not expect to observe the same effects for other emotions. If we run the same mediation analysis through enthusiasm, we find that it leads to lower intention to engage in protective behaviors (April: ACME=-0.015; p=0.23; June: ACME=-0.019; p=0.018; August: ACME=-0.017; p=0.042). We did not look at mediation through anger or disgust since the treatments did not have effects on those emotions (see Table 1).

Note: *p<0.05; **p<0.01

To measure support for protective policies, we asked people for their level of support (or opposition) for shelter-in-place orders, fines for those who violate shelter-in-place orders, increased government spending to help those who have lost jobs because of COVID-19, increased government spending on healthcare to address COVID-19, making testing free, and Medicare for all. We again create an additive scale across all of these measures, which runs from 0 to 30.[18] As hypothesized, Table 7[19] shows that those who experience elevated fear or sadness in reaction to scientific projections are more supportive of protective policies to address the pandemic across all three survey waves.[20,21] These findings provide strong support for H6a and H6b, that greater fear and sadness in reaction to the treatments leads to more support for protective policies to address the pandemic.

Table 7: Average Causal Mediation Effects of Emotion on Support for Protective Policies

	April Wave	June Wave	August Wave
Fear	0.257**	0.110**	0.080*
Sadness	0.097**	0.040**	0.054**

Note: *p<0.05; **p<0.01

Discussion and Conclusion

COVID-19 has presented the world with a uniquely threatening health pandemic, and people have experienced varied responses to that threat. We investigate how people react

[18] The Cronbach's alphas for these additive scales of protective policies are April $\alpha = 0.8$; June $\alpha = 0.83$; August $\alpha = 0.86$.

[19] Tables A11 and A12 have the results of the mediation analysis run separately for Republicans and Democrats. The patterns are very similar to what we observed for protective behaviors.

[20] In the April wave, the direct effect of the treatment is negative, -0.142, but not significant (p=0.329), so the increase in support for protective policies is only among those who experience elevated fear in reaction to the treatment.

[21] The findings through enthusiasm are different from the findings for protective behaviors. Those with elevated enthusiasm in reaction to the treatment are more supportive of protective policies (April: ACME=0.123; p=0.00; June: ACME=0.030; p=0.002; August: ACME=0.046; p=0.000).

emotionally to reading scientific information about the pandemic, how these reactions vary by partisanship, and how those emotions undergird specific attitudes on protectionist public policy and protectionist personal behaviors.

We find that respondents exposed to COVID-19 peak projections show increased fear and sadness as well as lower levels of enthusiasm. Interestingly, we observe in the early months of the pandemic (April) that partisans react similarly to reading the scientific projections, while Republicans react with more fear and sadness compared to Democrats in June. However, by August, this effect is attenuated for Republican respondents, who become less likely to exhibit increased fear and sadness in response to statistics about the likely peak of national COVID cases. Elevated fear and sadness in turn increase support for protective policies and behavior, which may help to explain why Republicans, who were less likely to feel anxiety and sadness in response to information on COVID later in the summer, were less supportive of protective public health policies. We suspect that this reflects how the pandemic became increasingly polarized along partisan lines, especially surrounding President's Trump's handling of the pandemic and public health mandates enacted by state and local politicians.

These findings for fear, especially at the early onset of the pandemic square well with existing research for other public health threats. When threats in the environment are not politicized, it is likely that many members of the public react to a public health threat with greater anxiety and support for protective behavior and policies, but when threats become politicized, we are more likely to observe differential reactions by partisanship (Albertson and Gadarian 2015). One important advantage to our study is that we are able to examine the effects of exposure to information about COVID-19 at several points in time, when the threat was less politicized and when it became more politicized in the U.S.

Furthermore, we explore an emotion that has received scant attention in the literature on public health threats and political attitudes, sadness. This emotion has been particularly salient given the sheer number of lives lost to COVID-19, as well as the emotional toll of being isolated from others for such a long stretch of time. Even though this emotion may lead people to be more inclined to turn attention away from threat, it still leads to support for protective policies and behavior, albeit to a lesser extent than anxiety.

Our study also sheds light on the emotions that are less likely to be affected by the type of information we presented to participants. Scientific projections on when COVID-19 cases would peak did not lead to consistently higher levels of anger or disgust. If the scientific information we presented focused instead on bodily fluids or symptoms linked to COVID-19, it would have likely led to higher levels of disgust, which may have also increased support for protective policies (Kam and Estes 2016). On the other hand, information by political elites that link COVID-19 to China, could lead to higher levels of anger, and in turn more negative attitudes and behaviors toward the Asian community (Chan et al. 2020; Dionne and Turkmen 2020; Reny and Barreto 2020), rather than to support for more protective policies.

Negative emotions individuals experience in reaction to information about a threat can influence the types of policies they support to address it, as well as personal behaviors that may protect them from the threat. To this point, we show that elevated feelings of fear and sadness lead to a greater intention to engage in behaviors aimed at mitigating the virus, such as practicing social distancing and mask use, and greater support for government policies like stay-at-home orders and assistance to combat the pandemic. The findings also suggest that as cases decline, individuals will be less likely to experience fear and sadness, and hence may be less inclined to engage in protective behaviors, or support policies like continued mask mandates.

Finally, these results have broad implications for health policy beyond the COVID-19 pandemic. While the scope of the pandemic is a unique challenge, emotional reactions to information about other public health threats might in turn affect support or opposition to policies aimed at mitigating those threats. These findings are important to policy makers as they consider how best to convey information about such threats to the public.

References

Aaroe, L., M. Osmundsen, M. B. Petersen. 2016. "Distrust As a Disease Avoidance Strategy: Individual Differences in Disgust Sensitivity Regulate Generalized Social Trust." *Frontiers in Psychology 28*. DOI: https://doi.org/10.3389/fpsyg.2016.01038.

Albertson, B. and S.K. Gadarian. 2015. *Anxious Politics: Democratic Citizenship in a Threatening World*. New York: Cambridge University Press.

Allcott, H., L. Boxell, J. Conway, M. Gentzkow, M. Thaler, and D. Yang. 2020. "Polarization and Public Health: Partisan Differences in Social Distancing During the Coronavirus Pandemic." *Journal of Public Economics*. DOI: https://doi.org/10.1016/j.jpubeco.2020.104254.

Brader, T. 2006. *Campaigns for Hearts and Minds: How Emotional Appeals in Political Ads Work.* Chicago: The University of Chicago Press.

Bullock, J. G., D. P. Green, and S. E. Ha. 2010. "Yes, but what's the mechanism? (Don't expect an easy answer)." *Journal of Personality and Social Psychology* 98: 550-558.

Campbell, A., P.E. Converse, W. E. Miller, and A. E. Stokes. 1960. *The American Voter*. New York: John Wiley & Sons, Inc.

Carver, C. S. 2004. "Negative affects deriving from the behavioral approach system." *Emotion 4*:3–22.

Cassino, D., and Y. Besen-Cassino. 2020. "Of Masks and Men? Gender, Sex, and Protective Measures during COVID-19." *Politics & Gender 16*: 1052-1062.

Chan, N., J. Y. Kim, and V. Leung. 2020. "Elite Messaging and Social Exclusion Shapes Asian American Partisan Attitudes During Times of Pandemic." *Working Paper*.

Clifford, S., and S. Piston. 2017. "Explaining Public Support for Counterproductive Homelessness Policy: The Role of Disgust." *Political Behavior 39*(2). DOI: 10.1007/s11109-016-9366-4.

Coan, Travis, J.L. Merolla, E.J. Zechmeister, and D. Zizumbo-Colunga. 2020. "Emotional Responses Shape the Substance of Information Seeking under Conditions of Threat." *Political Research Quarterly. DOI:* https://doi.org/10.1177/1065912920949320

Conover, P. J., and Feldman, S. 1986. "The Role of Inference in the Perception of Political Candidates." In Richard R. Lau and David O. Sears (eds.), *Political Cognition*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Coppock, A. and O. A. McClellan. 2019. “Validating the Demographic, Political, Psychological, and Experimental Results Obtained from a New Source of Online Survey Respondents.” *Research & Politics 6*(1).

Darmofal, D. 2005. “Elite Cues and Citizen Disagreement with Expert Opinion.” *Political Research Quarterly 58*: 381–395.

DeMora, S., J.L. Merolla, B. Newman, and E.J. Zechmeister. Forthcoming (2021). “"Reducing Mask Resistance with Value Consistent Messages: A Study of White Evangelical Christians.” *Proceedings of the National Academy of Sciences*.

Dorison, Charles A., Ke Wang, Vaughan W. Rees, Ichiro Kawachi, Keith M.M. Ericson, and Jennifer S. Lerner. 2020. “Sadness, but not all negative emotions, Heightens addictive substance use.” PNAS 117(2): 943-949.

Djupe, P.A. and R.P. Burge. 2020. “The Prosperity Gospel of Coronavirus Response.” *Politics and Religion*. DOI: https://doi.org/10.1017/S175504832000053X.

Dionne, K. Y. and F. F. Turkmen. 2020. “The Politics of Pandemic Othering: Putting COVID-19 in Global and Historical Context.” *International Organization 74*(S1): 213-230.

Fisk, K., J. L. Merolla, and J. M. Ramos. 2019. “Emotions, Terrorist Threat, and Drones: Anger Drives Support for Drone Strikes.” *Journal of Conflict Resolution 63*(4). DOI: https://doi.org/10.1177/0022002718770522.

Forgas, Joseph P. 1991. “Affective influences on partner choice: Role of mood in social decisions.” *Journal of Personality and Social Psychology* 61: 708–720.

Frijda, N. H. 1986. “Emotion, cognitive structure, and action tendency.” Cognition and Emotion 1(2): 115-143.

Fowler, E. F., and S. E. Gollust. 2015. “The Content and Effect of Politicized Health Controversies.” *Annals of the American Academy of Political and Social Science 658*(1): 155–71.

Gadarian, S.K., S.W. Goodman, and T.B. Pepinsky. 2021. “Partisanship, Health Behavior, and Policy Attitudes in the Early Stages of the COVID-19 Pandemic.” *PLOS 1. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0249596*

Garg, Nitika and Jennifer S. Lerner. 2013. “Sadness and consumption.” *Journal of Consumer Psychology* 23: 106–113.

Gauchata, G. 2012. “Politicization of Science in the Public Sphere: A Study of Public Trust in the United States, 1974 to 2010.” *American Sociological Review 77*(2): 167-187.

Gollust, S. H., R. H. Nagler, and E. F. Fowler. 2020. "The Emergence of COVID-19 in the U.S.: A Public Health and Communication Crisis." *Journal of Health Politics, Policy, and Law 45*(6): 967-981.

Green, J., J. Edgerton, D. Naftel, K. Shoub, and S. J. Cranmer. 2020. "Elusive consensus: Polarization in Elite Communication on the COVID-19 Pandemic." *Science Advances* 6.

Grossman, G. S. Kim, J. M. Rexer, and H. Thirumurthy. 2020. "Political Partisanship Influences Behavioral Responses to Governors' Recommendations for COVID-19 Prevention in the United States." *Proceedings of the National Academy of Sciences* 117(39): 24144-24153.

Haischer, M. H., R. Beilfuss, M. R. Hart, L. Opielinski, D. Wrucke, G. Zirgaitis, T. D. Uhrich, and S. K. Hunger. 2020. "Who is Wearing a Mask? Gender, Age, and Location-related Differences during the COVID-19 Pandemic." *PLOS ONE 15*(10). DOI: https:// doi.org/10.1371/journal.pone.0240785.

Harmon-Jones, E, C. Harmon-Jones C, L. Abramson L, and C.K. Peterson CK. 2009. "PANAS Positive Activation Is Associated with Anger." *Emotion 9*:183 – 196.

Hart, P. S., S. Chinn, and S. Soroka. 2020. "Politicization and Polarization in COVID-19 News Coverage." *Science Communication* 42(5): 679-697.

Huddy, L., S. Feldman, and E. Cassese. 2007. "On the Distinct Political Effects of Anxiety and Anger." In *The Political Dynamics of Feeling and Thinking*, eds. A. Crigler, M. MacKuen, G. E. Marcus, and W. R. Neuman. Chicago: University of Chicago Press.

Jamieson, K. H., and D. Albarracin. 2020. "The Relation between Media Consumption and Misinformation at the Outset of the SARS-CoV-2 Pandemic in the US." *Harvard Kennedy School Misinformation Review*. DOI: doi.org/10.37016/mr-2020-012.

Jarymowicz, M., and D. Bar-Tal. 2006. "The Dominance of Fear over Hope in the Life of Individuals and Collectives." *European Journal of Social Psychology 36*(3), 367–392.

Kam, C. D., and B. A. Estes. 2016. "Disgust Sensitivity and Public Demand for Protection." *The Journal of Politics 78*(2).

Lazarus, R. S. 1991. *Emotion and Adaptation*. New York: Oxford University Press.

Lerner, J. S., and D. Keltner. 2000. "Beyond Valence: Toward a Model of Emotion-specific Influences on Judgement and Choice." *Cognition and Emotion 14*(4): 473–493.

Lerner, Jennifer S., Deborah A. Small, and G. Loewenstein. 2004. "Heart strings and purse strings: Carryover effects of emotions on economic decisions." *Psychological Science* 15: 337–341.

Lerner, J.S. and L.Z. Tiedens. 2006. "Portrait of the angry decision maker: How appraisal tendencies shape anger's influence on cognition." *Journal of Behavioral Decision Making 19*(2): 115-137.

Lockhart, M., S. J. Hill, J. Merolla, M. Romero, and T. Kousser. 2020. "America's Electorate is Increasingly Polarized along Partisan Lines about Voting by Mail During the COVID-19 Crisis." Proceedings of the National Academy of Sciences 117(20). DOI: https://doi.org/10.1073/pnas.2008023117.

Marcus, G.E., W.R. Neuman, and M. MacKuen. 2000. *Affective Intelligence and Political Judgment*. Chicago: University of Chicago Press.

Mason, L. 2018. *Uncivil Agreement: How Politics Became Our Identity.* Chicago: University of Chicago Press.

Merolla, J., and E. Zechmeister. 2009. *Democracy at Risk: How Terrorist Threats Affect the Public*. Chicago: University of Chicago Press, Chicago Studies in American Politics Series.

Merolla, J. L., and E. J. Zechmeister. 2018. "Threat and Information Acquisition: Evidence from an Eight Country Study." *Journal of Experimental Political Science 5*(3): 167 -181. DOI: https://doi.org/10.1017/XPS.2018.4.

Motta, M., D. Stecula, and C. Farhart. 2020. "How Right-Leaning Media Coverage of COVID-19 Facilitated the Spread of Misinformation in the Early Stages of the Pandemic." *Canadian Journal of Political Science.* DOI: doi.org/10.1017/S0008423920000396.

Neuman, W.R., G. E. Marcus, A. Crigler, and M. MacKuen. 2007. *The Affect Effect: Dynamics of Emotion in Political Thinking and Behavior*. Chicago: University of Chicago Press.

Painter, M., and T. Qiu. 2020. "Political Beliefs Affect Compliance with COVID-19 Social Distancing Orders." *Working Paper.*

Perry, S., A. L. Whitehead, and J. B. Grubbs. 2021. "Prejudice and Pandemic in the Promised Land: How White Christian Nationalism Shapes Americans' Racist and Xenophobic Views of COVID-19." *Ethnic and Racial Studies* 44(5): 759-772.

Raghunathan, Rajagopal and Michel Tuan Pham. 1999. "All negative moods are not equal: Motivational influences of anxiety and sadness on decision making." *Organizational Behavior and Human Decision Processes* 79: 56–77.

Reny, Tyler T. 2020. "Masculine Norms and Infectious Disease: The Case of COVID-19." *Politics & Gender 16*: 1028-1035.

Reny, T. T. and M. A. Barreto. 2020. "Xenophobia in the Time of Pandemic: Othering, Anti-Asian Attitudes, and COVID-19." *Politics, Groups, & Identities*. DOI: 10.1080/21565503.2020.1769693.

Russell, James A. 1980. "A circumplex model of affect." *Journal of Personality and Social Psychology* 39: 1161–1178.

Small, Deborah A. and Jennifer S. Lerner. 2008. "Emotional Policy: Personal Sadness and Anger Shape Judgments about a Welfare Case." *Political Psychology* 29(2): 149-168.

Smith, C. A., and Ellsworth, P. C. 1985. "Patterns of Cognitive Appraisal in Emotion." *Journal of Personality and Social Psychology* 48(4): 813–838. DOI: https://doi.org/10.1037/0022-3514.48.4.813.

Sol Hart, P., S. Chinn, and S. Soroka. 2020. "Politicization and Polarization in COVID-19 News Coverage." *Science Communication* 42(5): 679-697.

Steimer, T. 2002. "The biology of fear- and anxiety-related behaviors." *Dialogues in Clinical Neuroscience 4*(3): 231-249.

Watson, D., Clark, L. A., and Tellegen, A. 1988. "Development and validation of brief measures of positive and negative affect: The PANAS scales." *Journal of Personality and Social Psychology 54(*6), 1063–1070. DOI: https://doi.org/10.1037/0022-3514.54.6.1063.

Zaller, J.R. 1992. *The Nature and Origin of Mass Opinion.* Cambridge: Cambridge University Press.

Online Appendix

Table A1: Balance Tables

Survey Wave	Condition	Male	Republican	Democrat	Senior Citizen	Bachelor's Degree	White	Black	Hispanic	Asian
April	Control	37	39	46	13	43	74	12	12	6
April	Fall Peak	39	38	46	16	42	78	12	9	5
April	Spring Peak	38	41	45	14	42	77	12	10	5
June	Control	50	38	47	19	48	75	14	10	5
June	Fall Peak	47	39	47	19	45	76	14	10	5
June	Spring Peak	47	42	44	18	47	74	14	11	7
August	Control	50	44	41	19	48	77	11	12	6
August	Treated	49	41	44	19	46	76	13	11	4

Table A2: Chi-Square Test between Treatment Assignments and Respondent Demographics

	Male	Republican	Democrat	Senior	Bachelor's Degree	White	Black	Hispanic	Asian
April	0.668	0.135	0.938	0.025	0.927	0.008	0.957	0.025	0.159
June	0.171	0.102	0.07	0.352	0.157	0.404	0.905	0.277	0.066
August	0.468	0.017	0.023	0.977	0.304	0.378	0.032	0.829	0.059

Table A3: Treatment Effects on Emotions, combined treatments, with controls

		Fear	Optimism	Sadness	Anger	Disgust
April	Treatment	0.366***	-0.176***	0.364***	0.063**	
		(0.032)	(0.029)	(0.036)	(0.030)	
	Male	-0.162***	0.241***	-0.101***	0.265***	
		(0.030)	(0.028)	(0.035)	(0.029)	
	White	0.010	-0.182***	-0.040	-0.051	
		(0.-37)	(0.034)	(0.042)	(0.035)	
	Age	-0.010***	0.005***	-0.010***	-0.014***	
		(0.001)	(0.001)	(0.001)	(0.001)	
	Bachelor's	0.187***	0.014	0.131***	0.142***	
	Degree	(0.033)	(0.031)	(0.038)	(0.032)	
	Constant	2.943***	2.748***	2.748***	2.605***	
		(0.054)	(0.061)	(0.061)	(0.051)	
	Observations	5,610	5,610	5,610	5,610	
	R-squared	0.055	0.030	0.036	0.066	
June	Treatment	0.128***	-0.107***	0.111***	-0.007	-0.145***
		(0.032)	(0.030)	(0.036)	(0.030)	(0.033)
	Male	-0.150***	0.177***	-0.097***	0.201***	0.176***
		(0.030)	(0.028)	(0.034)	(0.029)	(0.031)

	White	-0.071**	-0.051	-0.042	-0.065*	-0.112***
		(0.036)	(0.034)	(0.041)	(0.035)	(0.037)
	Age	-0.012***	0.003***	-0.014***	-0.015***	-0.015***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	Bachelor's	0.181***	0.088***	0.165***	0.164***	0.180***
	Degree	(0.033)	(0.031)	(0.037)	(0.032)	(0.034)
	Constant	2.998***	2.599***	2.995***	2.764***	2.702***
		(0.054)	(0.051)	(0.061)	(0.052)	(0.056)
	Observations	5,606	5,606	5,606	5,606	5,606
	R-squared	0.045	0.014	0.044	0.072	0.071
August	Treatment	0.086***	-0.085***	0.114***	0.056*	0.004
		(0.031)	(0.029)	(0.034)	(0.029)	(0.031)
	Male	-0.199***	0.190**	-0.121***	0.187***	0.147***
		(0.031)	(0.029)	(0.034)	(0.030)	(0.032)
	White	-0.078**	-0.076**	0.033	-0.017	-0.164***
		(0.037)	(0.035)	(0.042)	(0.036)	(0.038)
	Age	-0.015***	0.003***	-0.017***	-0.017***	-0.019***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	Bachelor's	0.164***	0.110***	0.215***	0.244***	0.242***
	Degree	(0.032)	(0.032)	(0.038)	(0.033)	(0.035)
	Constant	2.764***	2.588***	3.191***	2.917***	2.936***
		(0.052)	(0.145)	(0.058)	(0.050)	(0.053)
	Observations	5,773	5,773	5,773	5,773	5,773
	R-squared	0.066	0.015	0.056	0.081	0.093

Note: **p<0.05; ***p<0.01

Table A4: Treatment Effects on Emotions, separated by Fall and Spring treatments, with controls

		Fear	Optimism	Sadness	Anger	Disgust
April	Fall Peak	0.376***	-0.170***	0.379***	0.060	
		(0.037)	(0.034)	(0.042)	(0.035)	
	Spring Peak	0.357***	-0.182***	0.350***	0.066*	
		(0.037)	(0.034)	(0.042)	(0.035)	
	Male	-0.162***	0.241***	-0.101***	0.266***	
		(0.030)	(0.028)	(0.035)	(0.029)	
	White	0.010	-0.183***	0.040	-0.051	
		(0.037)	(0.034)	(0.042)	(0.035)	
	Age	-0.010***	0.005***	-0.010***	-0.014***	
		(0.001)	(0.001)	(0.001)	(0.001)	

	Bachelor's Degree	0.187***	0.014	0.131***	0.142***	
		(0.033)	(0.031)	(0.038)	(0.032)	
	Constant	2.944***	2.598***	2.749***	2.605***	
		(0.054)	(0.049)	(0.061)	(0.051)	
	Observations	5,610	5,610	5,610	5,610	
	R-squared	0.055	0.030	0.036	0.065	
June	Fall Peak	0.164***	-0.124***	0.149***	-0.008	-0.150***
		(0.037)	(0.035)	(0.042)	(0.035)	(0.038)
	Spring Peak	0.094**	-0.091***	0.075*	-0.007	-0.140***
		(0.036)	(0.034)	(0.041)	(0.035)	(0.037)
	Male	-0.150***	0.176***	-0.096***	0.201***	0.176***
		(0.030)	(0.028)	(0.034)	(0.029)	(0.031)
	White	-0.072**	-0.051	-0.042	-0.065	-0.112***
		(0.036)	(0.034)	(0.041)	(0.035)	(0.037)
	Age	-0.012***	0.003***	-0.014***	-0.015***	-0.015***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	Bachelor's Degree	0.182***	0.087***	0.166***	0.164***	0.180***
		(0.022)	(0.031)	(0.037)	(0.032)	(0.034)
	Constant	3.000**	2.598***	2.997***	2.764***	2.702***
		(0.054)	(0.051)	(0.061)	(0.052)	(0.056)
	Observations	5,606	5,606	5,606	5,606	5,606
	R-squared	0.045	0.015	0.045	0.072	0.071

Note: **p<0.05; ***p<0.01

Table A5: Party and Treatment Interaction Effects on Emotions

	Fear	Optimism	Sadness	Anger	Disgust

Treatment	0.162***	-0.200***	0.190***	0.008	-0.068*
	(0.087)	(0.026)	(0.032)	(0.029)	(0.037)
Democrat	0.373***	-0.373***	0.279***	0.177***	0.121***
	(0.031)	(0.028)	(0.035)	(0.031)	(0.040)
Independent	0.019	-0.650***	-0.050	-0.062	-0.060
	(0.043)	(0.039)	(0.049)	(0.043)	(0.055)
Treatment*Democrat	-0.011	0.053	-0.028	-0.028	-0.030
	(0.040)	(0.036)	(0.045)	(0.040)	(0.052)
Treatment*Independent	-0.009	0.205***	-0.083	-0.040	-0.069
	(0.040)	(0.051)	(0.063)	(0.055)	(0.073)
Constant	2.383***	3.096***	2.304***	6.592***	2.090***
	(0.022)	(0.020)	(0.025)	(0.066)	(0.028)
Observations	16,989	16,989	16,989	16,989	11,379
R-squared	0.027	0.039	0.014	0.007	0.005

Note: **p<0.05; ***p<0.01

Table A6: Party and Treatment Interaction Treatment Effects on Emotions, separated by Fall and Spring treatments

	Fear	Optimism	Sadness	Anger	Disgust
Spring Peak	0.201***	-0.243***	0.226***	0.009	-0.095
	(0.037)	(0.034)	(0.041)	(0.037)	(0.053)
Fall Peak	0.138***	-0.174***	0.197***	0.007	-0.057
	(0.032)	(0.029)	(0.043)	(0.032)	(0.041)
Democrat	-.373***	-0.373***	0.279***	0.177***	0.121***
	(0.031)	(0.028)	(0.035)	(0.031)	(0.040)
Independent	0.019	-0.650***	-0.050	-0.062	-0.060
	(0.043)	(0.039)	(0.048)	(0.043)	(0.055)
Spring*Democrat	-0.104**	0.106**	-0.109	-0.122**	-0.062
	(0.051)	(0.047)	(0.058)	(0.051)	(0.074)
Fall*Democrat	-0.043	0.021	-0.026	0.027	-0.018
	(0.044)	(0.040)	(0.050)	(0.044)	(0.056)
Spring*Independent	-0.052	0.262***	-0.170**	-0.067	-0.163
	(0.073)	(0.066)	(0.081)	(0.072)	(0.103)
Fall*Independent	0.018	0.170***	-0.130	-0.025	-0.031
	(0.062)	(0.056)	(0.082)	(0.061)	(0.079)
Constant	2.383***	3.096***	2.304***	2.197***	2.090**
	(0.062)	(0.020)	(0.025)	(0.022)	(0.028)
Observations	14,110	14,110	14,110	14,110	8,500
Adjusted R-squared	0.026	0.041	0.013	0.007	0.007

Note: **p<0.05; ***p<0.01

Table A7: Party and Treatment Interaction Treatment Effects on Emotions, with controls

	Fear	Optimism	Sadness	Anger	Disgust
Treatment	0.204***	-0.191***	0.227***	0.034	-0.041
	(0.029)	(0.026)	(0.032)	(0.083)	(0.036)
Democrat	0.334***	-0.300***	0.245***	0.163***	0.180**
	(0.029)	(0.027)	(0.033)	(0.028)	(0.036)
Independent	-0.035	-0.453***	-0.012	-0.099***	-0.106***
	(0.032)	(0.029)	(0.036)	(0.031)	(0.040)
Male	-0.090***	0.255***	-0.025	0.318***	0.282***
	(0.018)	(0.016)	(0.020)	(0.017)	(0.023)
White	0.080***	-0.162***	0.105***	0.019	-0.097**
	(0.022)	(0.020)	(0.024)	(0.021)	(0.028)
Age	-0.013***	0.002***	-0.014***	-0.016***	-0.019***
	(0.001)	(0.0005)	(0.001)	(0.001)	(0.001)
Bach Degree	0.204***	0.095***	0.170***	0.192***	0.245***
	(0.018)	(0.016)	(0.020)	(0.017)	(0.023)
Treatment*Democrat	-0.045	0.024	-0.049**	-0.138	-0.094
	(0.037)	(0.034)	(0.042)	(0.108)	(0.094)
Treatment*Independent	-0.112**	0.141***	-0.152***	-0.216	-0.214**
	(0.041)	(0.038)	(0.047)	(0.120)	(0.105)
Constant	2.901***	2.965***	2.817***	2.705***	2.819***
	(0.037)	(0.034)	(0.042)	(0.036)	(0.047)
Observations	16,989	16,989	16,989	16,989	11,379
R-squared	0.071	0.058	0.049	0.090	0.100

Note: **p<0.05; ***p<0.01

Table A8: Party and Treatment Interaction Treatment Effects on Emotions, separated by Fall and Spring treatments, with controls

	Fear	Optimism	Sadness	Anger	Disgust
Spring Peak	0.225***	-0.224***	0.251***	0.041	-0.064
	(0.037)	(0.034)	(0.041)	(0.035)	(0.051)
Fall Peak	0.190***	-0.171***	0.212***	0.029	-0.032
	(0.032)	(0.029)	(0.036)	(0.031)	(0.039)
Democrat	0.334***	-0.300***	0.245***	0.163***	0.079**
	(0.029)	(0.027)	(0.033)	(0.028)	(0.036)
Independent	-0.035	-0.453***	-0.012	-0.099***	-0.106***
	(0.032)	(0.029)	(0.036)	(0.031)	(0.040)
Male	-0.089***	0.254***	-0.025	0.317***	0.282***
	(0.018)	(0.016)	(0.020)	(0.017)	(0.023)
White	0.080***	-0.162***	0.105***	0.019	-0.098**
	(0.022)	(0.020)	(0.024)	(0.021)	(0.028)
Age	-0.013***	0.002***	-0.014***	-0.016***	-0.019***
	(0.001)	(0.005)	(0.001)	(0.001)	(0.001)
Bach Degree	0.205***	0.095***	0.170***	0.193***	0.246***
	(0.018)	(0.016)	(0.020)	(0.017)	(0.023)
Spring*Democrat	-0.134***	0.065	-0.125**	-0.156***	-0.122*
	(0.048)	(0.044)	(0.054)	(0.046)	(0.067)
Fall*Democrat	0.007	-0.001	-0.004	0.019	-0.022
	(0.041)	(0.038)	(0.047)	(0.040)	(0.051)
Spring*Independent	-0.115**	0.184***	-0.201***	-0.096	-0.160**
	(0.053)	(0.049)	(0.060)	(0.052)	(0.074)
Fall*Independent	-0.107***	0.114**	-0.121***	-0.055	-0.083
	(0.046)	(0.042)	(0.052)	(0.045)	(0.057)
Constant	2.903***	2.966***	2.818***	2.708***	2.821***
	(0.037)	(0.034)	(0.042)	(0.036)	(0.047)
Observations	16,989	16,989	16,989	16,989	11,379
R-squared	0.072	0.058	0.050	0.092	0.101

Note: **p<0.05; ***p<0.01

Table A9: Average Causal Mediation Effects of Emotion on Protective Behaviors, among Republicans

	April Wave	June Wave	August Wave
Fear	0.291**	0.224**	-0.065
Sadness	0.142**	0.128**	0.010

Note: *p<0.05; **p<0.01

Table A10: Average Causal Mediation Effects of Emotion on Protective Behaviors, among Democrats

	April Wave	June Wave	August Wave
Fear	0.165**	0.035805	0.076**
Sadness	0.062**	-0.0018	0.009

Note: *p<0.05; **p<0.01

Table A11: Average Causal Mediation Effects of Emotion on Support for Protective Policies, among Republicans

	April Wave	June Wave	August Wave
Fear	0.301**	0.222**	-0.057
Sadness	0.169**	0.114**	0.014

Note: *p<0.05; **p<0.01

Table A12: Average Causal Mediation Effects of Emotion on Support for Protective Policies, among Democrats

	April Wave	June Wave	August Wave
Fear	0.158**	0.037	0.080**
Sadness	0.020	-0.002	0.009

Note: *p<0.05; **p<0.01

Figure A1: Predicted Levels of Enthusiasm by Condition and Partisanship

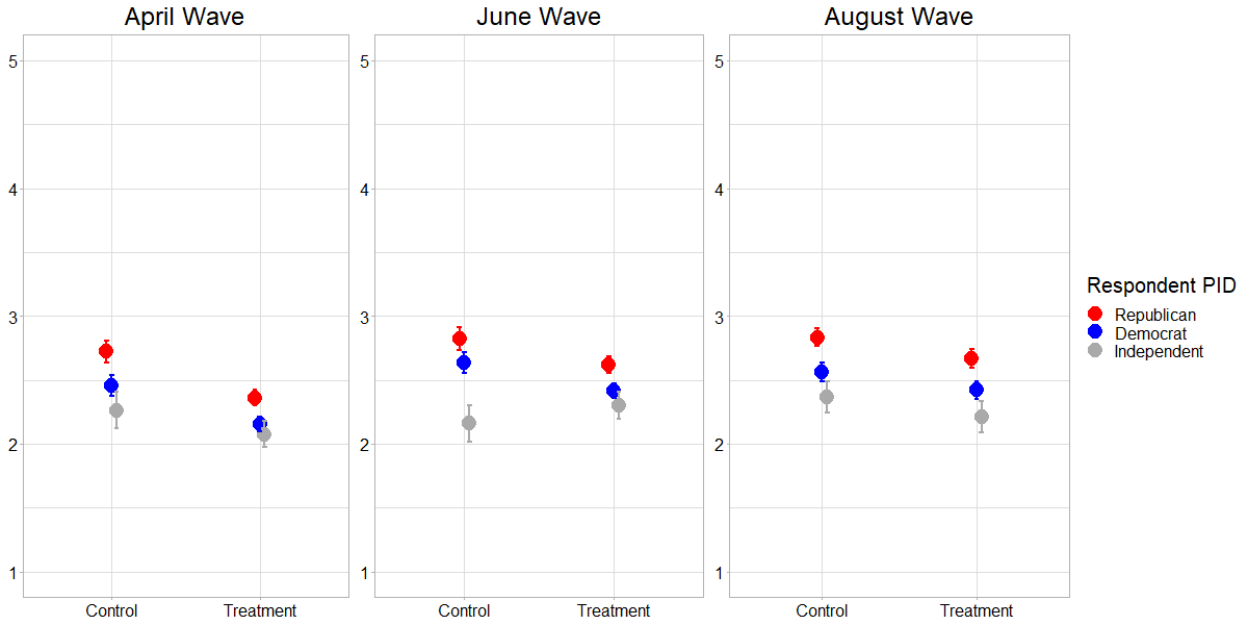


Figure A2: Predicted Levels of Anger by Condition and Partisanship

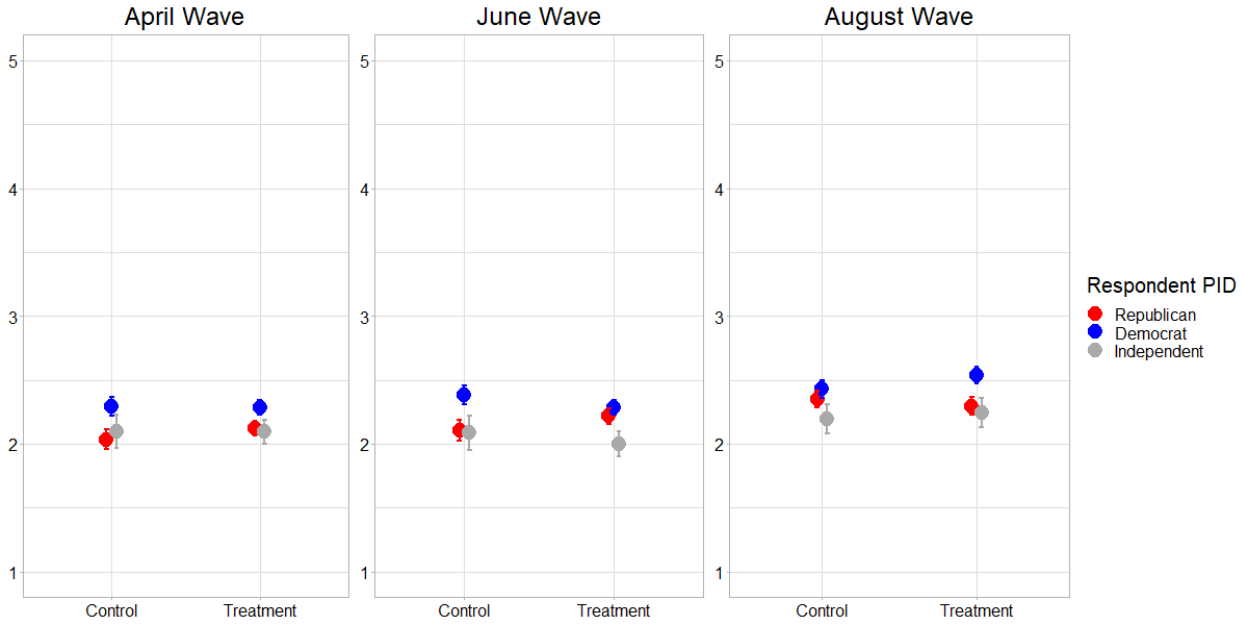


Figure A3: Predicted Levels of Disgust by Condition and Partisanship

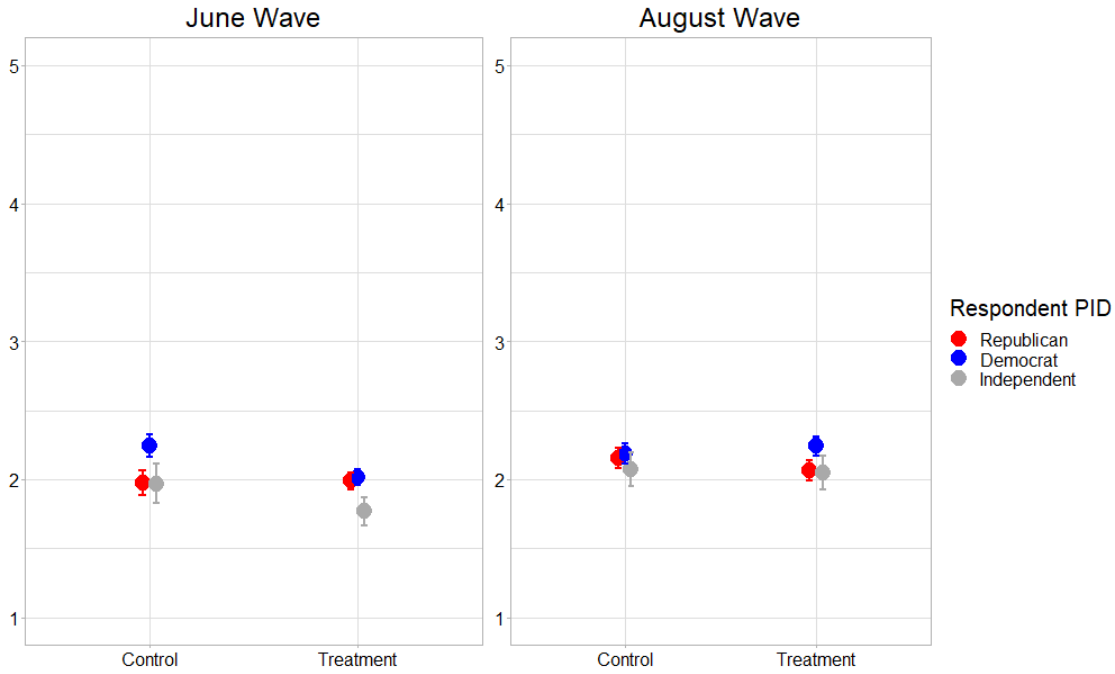


Figure A4: Sensitivity of mediation analysis estimates presented in Table 6.

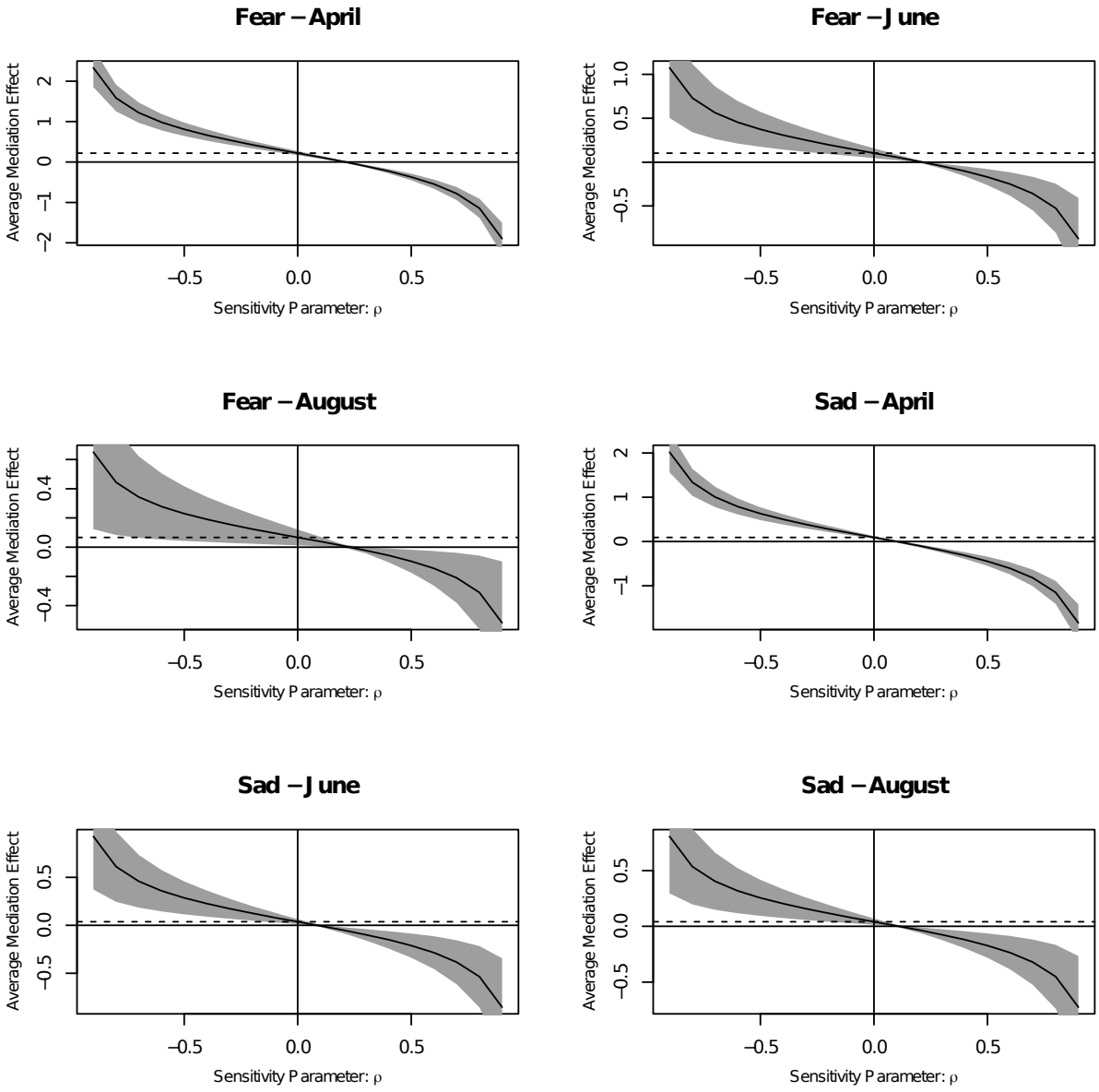


Figure A5: Sensitivity of mediation analysis estimates presented in Table 7.