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Trust in experts, not trust in national leadership, leads to greater uptake of recommended actions during the COVID-19 pandemic

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Abstract

Evidence suggests that people vary in their desire to undertake protective actions during a health emergency, and that trust in authorities may influence decision making. We sought to examine how the trust in health experts and trust in White House leadership during the COVID-19 pandemic impacts individuals' decisions to adopt recommended protective actions such as mask-wearing. A mediation analysis was conducted using cross-sectional U.S. survey data collected between March 27 and 30, 2020, to elucidate how individuals' trust in health experts and White House leadership, their perceptions of susceptibility and severity to COVID-19, and perceived benefits of protecting against COVID-19, influenced their uptake of recommended protective actions. Trust in health experts was associated with greater perceived severity of COVID-19 and benefits of taking action, which led to greater uptake of recommended actions. Trust in White House leadership was associated with lower perceived susceptibility to COVID-19 and was not associated with taking recommended actions. Having trust in health experts is a greater predictor of individuals' uptake of protective actions than having trust in White House leadership. Public health messaging should emphasize the severity of COVID-19 and the benefits of

protecting oneself while ensuring consistency and transparency to regain trust in health experts.

BACKGROUND

Introduction

In December 2019, an infectious disease outbreak was reported in China, later determined to be caused by SARS-CoV-2, a novel coronavirus. The first confirmed case in the United States of the disease known as COVID-19 was announced on January 20, 2020, and by March 11 when the World Health Organization (WHO) declared a pandemic, there were already 1,267 confirmed cases (AJMC Staff, 2020). Nine months later, there are almost 15 million confirmed cases of COVID-19 and 283,000 deaths attributed to the disease in the United States, with numbers increasing daily (Centers for Disease Control and Prevention [CDC], 2020a).

The rapid spread of the virus in the United States meant that early attempts at containment quickly switched to mitigation efforts to curtail the further spread. Previous studies have found that the spread of pandemics can be successfully mitigated by individuals' adherence to recommended actions, such as increased hygiene, sheltering in place, avoiding contact with others, restricting travel, getting vaccinated, and wearing a face mask when in public (Brienen et al., 2010; Ferguson et al., 2005; Germann et al., 2006; Longini et al., 2005; Nuño et al., 2007; van Genugten et al., 2003). Public health analyses of the 2002–2004 SARS epidemic generally acknowledge that simple measures to protect against transmission were largely responsible for controlling the outbreak (Naylor et al., 2004; Riley et al., 2003).

Literature review

Despite the potentially life-saving nature of individual-level protective actions during a pandemic, evidence suggests that people vary greatly in their desire to undertake recommended actions in the face of an emergency, with various factors influencing their decision. For example, studies have shown that the decision to evacuate during a hurricane is influenced by sociodemographic characteristics, such as age, gender, or race (Gabe et al., 2005; Gray-Graves et al., 2011; Lindell, 2012; Reininger et al., 2013), perceptions of personal threat or risk (Bateman & Edwards, 2002; Huang et al., 2012; Morss & Hayden, 2010), access to official evacuation advisories or orders (Dow & Cutter, 2000; Zhang et al., 2007), geographic location (Reininger et al., 2013; Stein et al., 2010), and the influence of neighbors or friends (Lazo et al., 2010; Lindell et al., 2005, Norris et al., 1999; Stein et al., 2010; K. S. Taylor et al., 2009), among other factors. These studies have also underscored the complex interplay of different factors and their impact on the protective actions taken. For example, one study of evacuation decision making among residents in Florida and Texas found that evacuation intentions decreased with age when an evacuation order was in place, but increased with age when individuals saw a forecast that a hurricane would hit

one's area, suggesting an interaction between age and information source and type (Lazo et al., 2015).

Similar findings have been characterized in studies of behavioral responses to prior disease outbreaks. In the context of the first SARS and influenza H1N1 epidemics, perceptions of threat or risk to oneself have been shown to be a strong driver of the decision to take protective actions, such as wearing a face mask (J. Jones & Salathé, 2009; G. M. Leung et al., 2005). A survey study of factors influencing behavioral responses to the H1N1 pandemic found that the extent to which individuals undertook protective actions, such as avoiding large gatherings or washing hands more frequently, was influenced by their subjective anxiety level, which, in turn, was mediated by perceived personal risk, controlling for demographic, epidemiological, and geographic variables (J. Jones & Salathé, 2009). A systematic review of public perceptions and behaviors during the H1N1 pandemic also noted regional differences in the behavioral responses undertaken. For example, face mask use and improved hygiene were higher among people in Mexico than in other countries, likely due to the greater impact of the pandemic in Mexico at the time and greater acceptability of recommended protective actions. In Mexico, the government strongly recommended and distributed face masks to reduce transmission (Bults et al., 2015). Other studies have found that individuals with a heightened sense of risk perception, along with moderate anxiety were more likely than others to take protective actions against infection from SARS (G. M. Leung et al., 2003). In one study of responses to the 2003 SARS outbreak, male respondents, individuals at the extremes of age, and individuals with lower educational levels were less likely to engage in self-protective behavior.

These studies and others (Liao et al., 2010; Paek et al., 2008; Plough et al., 2011; Teasdale & Yardley, 2011) suggest that in addition to sociodemographics, perceptions of risk play an important role in influencing an individual's decision to take protective actions against COVID-19. Perceptions of risk, knowledge, and responsibilities during an emergency or disaster context are largely shaped by information received about the situation, and tied to trust in the source and accuracy of the information. For example, a study of individual perceptions of the newly found earthquake hazard in Oklahoma found that individuals who believed the government was knowledgeable about the hazard and acted responsibly for protecting its citizens from the risks were also more trusting of the government's ability and willingness to mitigate the hazard (Murphy et al., 2018). In turn, trusted information sources can influence the acceptance of recommended measures (Siegrist et al., 2003). Effective and consistent communication from government leaders and public health officials is necessary to assuring trust in recommendations and facilitating adherence to protective behaviors (Dupras & Williams-Jones, 2012; Quinn et al., 2013). Studies have shown that a high level of public trust is related to compliance with recommended measures (Plough et al., 2011; Vaughan & Tinker, 2003). Furthermore, decreased trust in the government's ability to effectively manage a threat may result from inconsistent communication and consequently increasing skepticism about public health recommendations (R. D. Smith, 2006; Vaughan & Tinker, 2009).

This is acutely apparent in the current national discourse around COVID-19, where inconsistent messaging and clashes between national leadership and health experts regarding recommended actions have contributed to growing political conflict over individuals' adoption of protective actions. Recent polls have shown that Americans are divided along political lines regarding their preferences for lifting government restrictions (Perez, 2020) and their uptake of expert recommendations (Padilla, 2020). Relatedly, polling data also suggest that throughout the COVID-19 pandemic, Americans have given high (above 90%) approval ratings to healthcare providers/

institutions and medical experts for their handling of the crisis, but much lower (~48%–49%) approval ratings to current national leadership, including the President and Congress (Younis, 2020). These data suggest that complex factors may be influencing individual-level uptake of recommended protective behaviors.

Research objective

We sought to elucidate the key factors associated with the uptake of protective actions against COVID-19, particularly the role of trust in government and in health experts in influencing the decision to adopt these actions. As others have noted (J. Jones & Salathé, 2009), information on trust, risk perception, and protective responses have rarely been captured at the outset of an epidemic, when the information is most relevant, illuminating, and useful to health officials and policymakers. Here, we report results from an online survey gathering this information in the first weeks of the COVID-19 pandemic in the United States. A better understanding of these factors could guide future messaging and policies aimed at mitigating the spread of COVID-19 and preventing future outbreaks.

Conceptual framework and hypotheses

The Health Belief Model (HBM) has been used to explain individual decision making about recommended actions during infectious disease outbreaks (Sim et al., 2014). The model posits that perceptions of susceptibility to a disease, severity of the disease, and perceived benefits of taking action to prevent or avoid the disease, all influence the likelihood that an individual will adopt recommended health behaviors (Skinner et al., 2015). The HBM also posits that certain cues to action, such as expert guidance or media stories, can trigger the decision making process to undertake a recommended action, by influencing perceptions of the condition (Bish & Michie, 2010; Champion & Skinner, 2008).

Guided by the HBM, we hypothesize that having trust in health experts or trust in White House leadership can serve as an important cue to take recommended actions against COVID-19. Indeed, having trust in experts, or specialized sites of knowledge like healthcare providers, is often cited as an explanation for the extent to which patients adhere to recommended health behaviors (Graham et al., 2015; Jacobs et al., 2006; Lukoschek, 2003; Martins & Norris, 2004; Peters et al., 2006; Trachtenberg et al., 2005). Trust in a healthcare provider may influence one's perceptions and beliefs around the need to undertake certain health behaviors, with lower trust decreasing one's perceptions regarding need and higher trust increasing one's perceptions of need. A prior study found that trust in healthcare providers was an important cue for a pregnant woman to adhere to a prescribed antibiotic regimen by increasing their perceptions of the benefits of antibiotics and reducing perceptions of barriers to adherence (Chen et al., 2020).

As such, we hypothesize that greater trust in experts will be associated with a greater number of recommended actions taken, directly, and also through increased perceptions of susceptibility to and severity of COVID-19, and greater perceived benefits of taking recommended actions due to the messaging and behaviors modeled by experts regarding the pandemic. Given that messaging from White House leaders has downplayed the risks of COVID-19 and often been in direct conflict with that of health experts (Goldberg, 2020), we further hypothesize that trust in White
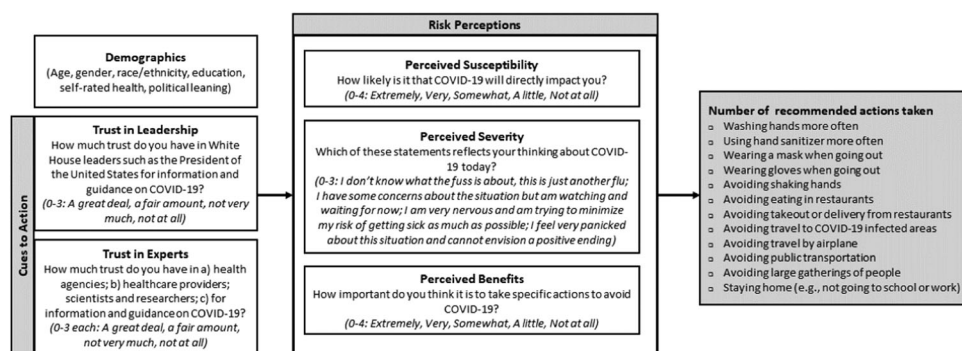
FIGURE 1 Hypothesized relationships and key measures

House leadership will be associated with lower perceptions of susceptibility, severity, and benefits, and thus, fewer recommended actions taken (Figure 1).

METHODS

Approach

We developed and programmed a web survey on the SelectSurvey platform. We fielded the survey approximately 2 weeks after the pandemic was declared via the Amazon Mechanical Turk (MTurk) online labor marketplace. MTurk is a digital marketplace where users (i.e., "workers") can sign up anonymously to complete various online tasks, including web surveys. It offers a key advantage over more traditional survey methods in that it is a cost-effective way to quickly recruit large samples and collect near real-time responses (J. Jones & Salathé, 2009), which was critical to our evaluation of trust, perceptions, and actions taken early in the pandemic. MTurk uses a reputation system to minimize the potential for bad actors, offers a secure way to pay participants, and the quality of data provided by MTurk samples is typically high, equivalent to traditional college student samples (Farrell et al., 2017). Indeed, some have suggested that MTurk participants are more diverse than other convenience samples (Berinsky et al., 2012; Cassese et al., 2013). Unique IDs assigned to each MTurk worker ensure that surveys are not repeated.

We limited survey eligibility to respondents aged 18 years or older based in the United States. All participants were paid $2 for participating in the survey, based on a rate slightly higher than federal minimum wage and an estimated 7 min for survey completion. The total payout to participants was $2016. We began fielding the survey on March 27 and closed the field on March 30, when we reached our minimum target number of participants and budget limit. All procedures were reviewed and approved by the research team's Institutional Review Board.

Survey measures

The survey instrument was developed with input from researchers with combined expertise in clinical and health psychology, risk perception and communication, disaster preparedness and response, and health behavior. All measures relevant to

this study are included in Figure 1. Undergirded by the core constructs of the HBM, the survey included single-item measures of perceptions of susceptibility to COVID-19 (scale 0–4; *not at all* to *extremely likely*), perceptions of the severity of the pandemic (scale 0–3; *I don't know what the fuss is about so I feel panicked and cannot envision a positive ending*), and perceptions of the benefits or importance of taking action to protect oneself from the virus (scale 0–4; *not at all* to *extremely important*). Survey items corresponding to the HBM constructs were derived from prior studies of risk and threat perception in various disaster contexts, modified to reflect the novel circumstances of the current pandemic (de Zwart et al., 2009; M. Taylor et al., 2011). In particular, given how little was known about the pandemic among the general public in March 2020, we modified the item corresponding to perceptions of severity to better reflect the common schools of thought in the public consciousness and media. For example, several groups, including the U.S. President, had consistently downplayed COVID-19 as being similar to the flu, with minimal consequences for most people (Darcy, 2020; Thompson, 2020), whereas, in contrast, other groups were drumming the message that COVID-19 was highly infectious and potentially deadly and, thus, should be taken seriously (Frieden, 2020; Resnick, 2020). To capture these pervasive but orthogonal sentiments, we used concrete descriptive language to reflect each response category of *not at all severe* ("I don't know what the fuss is about, this is just another flu") to *extremely severe* ("I feel very panicked about this and cannot envision a positive ending"). Through the item development process, the research team reached the consensus that final descriptors captured the spirit of each category of severity in the temporal context of the pandemic in the United States.

The survey also assessed various cues to action; relevant to this study is a measure of trust in experts constructed by combining three items regarding trust in health agencies, trust in healthcare providers, and trust in scientists and researchers (Cronbach's $\alpha = 0.80$; scale 0–9; *no trust at all* to *a great deal of trust*) and a measure of trust in White House leadership (scale 0–3; *no trust at all* to *a great deal of trust*). Trust questions were modeled after items regularly used in national polls (Funk et al., 2019).

Our primary outcome measure was a checklist question regarding 12 distinct actions taken to avoid getting COVID-19. The list of actions was based on a review of current recommendations regarding COVID-19 response (CDC, 2020b) as well as guidance in existing state policies (e.g., California Department of Public Health, 2020; New York State Department of Health, 2020), and reflect hygiene practices (e.g., washing hands and wearing a mask) and social distancing practices (e.g., staying home and avoiding large gatherings).

We also captured sociodemographic information, including age, gender (male or female), race/ethnicity, education, self-rated health, and political beliefs. Age was captured as a free-text item and treated as a continuous variable. Race was measured across 11 categories modeled after the U.S. Census and collapsed into four categories: White, Black or African American, Asian (including Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, Other Asian), and Other (American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, Other). Ethnicity was a separate yes/no question capturing Hispanic, Latino, or Spanish origin. Education was assessed across seven categories and collapsed into four: Some college or less, 2-year college graduate, 4-year college graduate, and more than a 4-year college degree. We assessed self-rated health on a 5-point excellent to poor response scale (Stewart et al., 1992). We also captured political leaning on a 5-point scale of very conservative to very liberal (Saad, 2020), collapsed into conservative, moderate, or liberal.

Analysis

Respondents with missing data on any questions necessary for our analyses were not included in our analyses ($N = 97$). We conducted univariate analyses to describe the composition of our sample by age, gender, race/ethnicity, education, self-rated health, and political leaning. We calculated mean scores and standard deviations (SD) for trust variables, perceptions variables, and recommended actions taken.

To test our hypotheses regarding the relationships among the primary predictors (trust in experts and trust in White House leadership), hypothesized mediators (perceptions of susceptibility, severity, and benefits), and the outcome (recommended actions taken), we conducted a mediation analysis (MacKinnon et al., 2002). In this approach, the relationship between our independent variables of trust in experts or trust in White House leadership and the dependent variable of recommended actions taken are decomposed into two effects: the direct effect of trust on actions taken, and an indirect effect whereby trust is linked to actions taken by the mediators of perceptions of susceptibility, severity, and benefits. Several studies have considered the explanatory role of the HBM as a mediation model, including the context of pandemic-related vaccination decisions (Ashbaugh et al., 2013; C. L. Jones et al., 2015; Scherr et al., 2017). One study found that dispositional worry; i.e., chains of unwanted, negative, chronic thoughts about future outcomes, was directly positively related to vaccination intention and that the effect of worry on vaccination intention was mediated by perceptions of threat, benefits, and barriers (Scherr et al., 2017). Another study of a flu vaccine campaign found that perceptions of barriers mediated the relationship between exposure to the vaccine campaign and vaccination (C. L. Jones et al., 2015).

We built our mediation model through a series of linear regressions: (1) trust variables regressed on recommended actions taken; (2) perceptions of susceptibility, severity, and benefits regressed on recommended actions taken; (3) trust variables regressed on perceptions; and (4) trust and perceptions regressed on recommended actions taken. All models controlled for demographic variables, self-rated health, and political leanings (moderate or conservative relative to liberal). All coefficients were standardized so that variable impacts are comparable.

FINDINGS

Sample description

Of the 720 responses that we received, 623 completed all elements of the survey. Our sample was predominantly male (62%) and White (75%), with an average age of 37 years. Just over half (51%) had graduated from a 4-year college. Slightly more respondents were liberal (44%) than conservative (35%). The majority of individuals (63%) rated their health as very good or excellent (Table 1).

Model variables

Model variables—perceptions, trust, and recommended actions taken—are also shown in Table 1. Almost half the respondents (49%) felt that it was very or extremely likely that the pandemic would directly impact them (perceived susceptibility: mean = 2.4, SD = 1.1), and the vast majority (88%) felt it was very or extremely

TABLE 1 Respondent characteristics, perceptions, trust, and actions ($N = 623$)

	%	Mean (*SD*)	Mode
Age		37.0 (11)	30
Sex			
Male	62.3		
Female	37.7		
Education			
Some college or less	22.8		
2-year graduate	11.2		
4-year graduate	50.7		
>4-year graduate	15.2		
Race			
White	74.6		
Black	18.3		
Asian	5.5		
Other	1.6		
Ethnicity			
Hispanic	18.0		
Political leaning			
Conservative	35.0		
Moderate	20.6		
Liberal	44.4		
Self-rated health		2.73 (0.95)	3
Perceptions			
Perceived susceptibility[a]		2.40 (1.1)	3
Perceived severity[b]		1.69 (0.7)	2
Perceived benefits[c]		3.45 (0.8)	4
Trust			
Trust in experts[d]		6.70 (2.2)	9
Trust in White House leadership[e]		1.33 (1.1)	0
No. of recommended actions taken		7.6 (3.2)	10

[a]0 = *Not at all likely*; 4 = *Extremely likely*.

[b]0 = *I don't know what the fuss is about, this is just another flu*; 3 = *I feel very panicked about this situation*.

[c]0 = *Not at all important*; 4 = *Extremely important*.

[d]0 = *No trust*; 3 = *A great deal of trust*.

[e]0 = *No Trust*; 9 = *A great deal of trust*.

important to take action to avoid getting COVID-19 (perceived benefits: mean = 3.45, SD = 0.8). More than half (62%) felt "very nervous" or "very panicked" about COVID-19, and all but 27 respondents (4%) had at least "some concerns" (perceived severity: mean = 1.69, SD = 0.72).

Only 18% of the respondents in our sample reported having a great deal of trust in White House leadership for information on COVID-19 (mean = 1.33, SD = 1.2), whereas more than half of respondents (58%) reported having a great deal of trust in health experts (mean = 6.70, SD = 2.2).

Respondents reported implementing, on average, 7.6 of the 12 recommended actions. Four respondents indicated they had undertaken none of the 12 listed actions, whereas 61 respondents reported they had undertaken all. The most frequently taken actions were washing hands more often (86%), followed by avoiding shaking hands (79%), and avoiding restaurants (74%). The least frequently taken actions were wearing gloves (32%), wearing a mask when going out (33%), followed by avoiding takeout/delivery (45%) (Figure 2).

Mediation model effects

We first sought to establish whether there were direct effects of trust in experts and trust in White House leadership on recommended actions taken. Linear regression models predicting the number of actions taken as a function of the two trust variables and control variables revealed that there was no effect of trust in White House leadership on taking recommended actions. However, greater trust in experts was associated with taking more recommended actions ($\beta = 0.30$; $p < 0.01$), while being politically conservative ($\beta = -0.14$; $p < 0.01$) or politically moderate ($\beta = -0.09$; $p < 0.05$) or being Hispanic ($\beta = -0.11$; $p < 0.01$) were each associated with taking fewer actions.

Next, we examined the association of each of the hypothesized mediators with the outcome. Linear regression models predicting the number of recommended actions
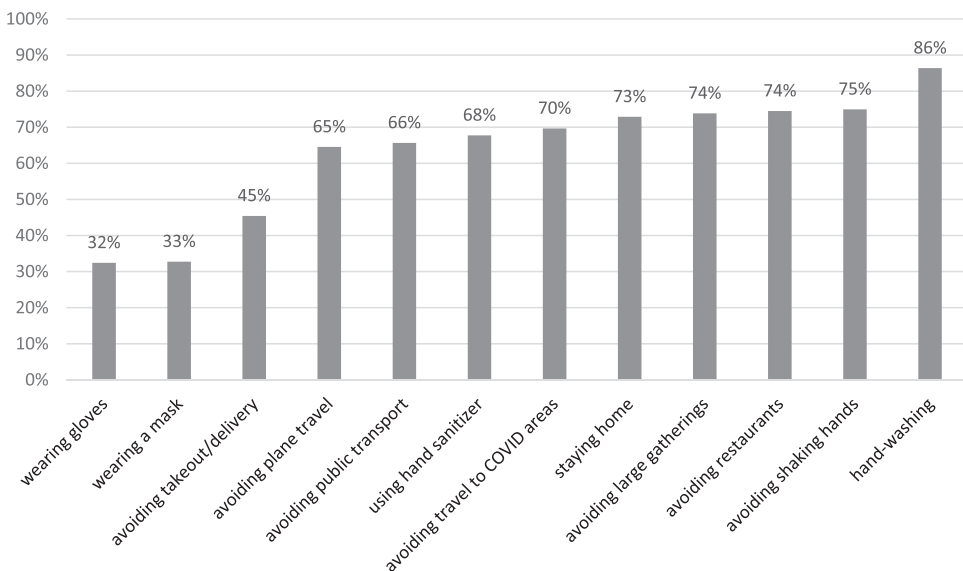

FIGURE 2 Percent of respondents endorsing recommended protective actions

taken as a function of the three perception variables controlling for demographic variables and political leaning revealed that higher perceived severity ($\beta = 0.17$; $p < 0.01$) and perceived benefits ($\beta = 0.37$; $p < 0.01$) were associated with taking more recommended actions. There was no effect of perceived susceptibility on the uptake of recommended actions.

Next, we examined the relationships between having trust in experts or trust in White House leadership and each of the hypothesized mediators. These models revealed that greater trust in experts was significantly associated with higher perceived susceptibility ($\beta = 0.13$; $p < 0.01$), higher perceived severity ($\beta = 0.19$; $p < 0.01$), and higher perceived benefits ($\beta = 0.28$; $p < 0.01$). In contrast, greater trust in White House leadership was associated with lower perceived susceptibility ($\beta = -0.14$; $p < 0.01$) and not associated with the other two perception variables. In addition, higher education was associated with higher perceived susceptibility ($\beta = 0.10$; $p < 0.05$), and being politically conservative or politically moderate were each negatively associated with perceived severity (conservative $\beta = -0.20$; $p < 0.01$; moderate $\beta = -0.12$; $p < 0.01$) and with perceived benefits (conservative $\beta = -0.10$; $p < 0.05$; moderate $\beta = -0.11$; $p < 0.01$).

Finally, in the full mediation model, we specified the direct effects of the two trust variables on recommended actions taken in addition to the effects mediated by the three perception variables (Figure 3). Despite two nonsignificant effects in the model building phase described above, trust in White House leadership, and perceived susceptibility were both retained in the full model to allow for a complete picture of the interrelationships among all variables of interest. The full mediation model shows that the relationship between trust in experts and recommended actions taken is partially mediated by perceived severity and perceived benefits, whereas a significant direct effect of trust in experts on recommended actions taken remains ($\beta = 0.18$; $p < 0.01$). Interestingly, the associations of political leanings (being conservative or moderate relative to liberal) on recommended actions taken are fully mediated through perceived severity and benefits. Additionally, being Hispanic ($\beta = -0.10$; $p < .0.01$) was negatively and directly associated with uptake of recommended actions, as was being Black ($\beta = -0.08$; $p < 0.05$).

In summary, greater trust in experts had both a direct/full and a partial (i.e., mediated by perceptions of severity and benefits) positive effect on uptake of recommended actions, whereas greater trust in White House leadership was associated with lower perceived susceptibility but had no effect on uptake of recommended actions.
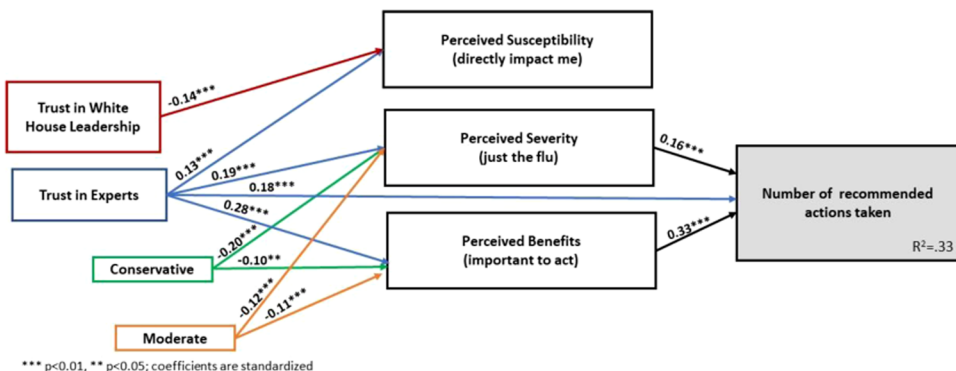

FIGURE 3 Effects of trust in experts and national leadership on taking recommended actions

Influence of political leaning

In our preliminary examination of model variables, we noted that being conservative was moderately correlated with trust in White House leadership (Pearson's $r = 0.48$). We, thus, specified our full mediation model without political leaning to identify any effects of trust in White House leadership that might have been suppressed. When political leaning is removed from the full model, greater trust in White House leadership continues to be associated with lower perceived susceptibility ($\beta = -0.12$; $p < 0.01$), and is additionally associated with lower perceived severity ($\beta = -0.15$; $p < 0.01$) and lower perceived benefits of taking action ($\beta = -0.13$; $p < 0.01$). Although there is still no direct effect of trust in White House leadership on taking recommended actions, the removal of political leanings reveals an indirect negative effect on taking recommended actions.

DISCUSSION

Given the importance of individual actions to protect against COVID-19 and mitigate viral spread, we sought to understand what factors might encourage uptake of recommended protective actions. We captured a critical snapshot of a modern-day pandemic—public perceptions of susceptibility to and severity of the pandemic, as well as perceptions of taking protective actions to reduce personal risks before state and local governments intervened with the shutdowns that persist today. We found that having trust in health experts plays an important direct role in facilitating the uptake of recommended actions and an equally important indirect role by increasing the perceived severity of COVID-19 and perceived benefits of taking action. Unfortunately, Americans remain divided regarding who they trust for COVID-19 information and whether they take protective actions, such as mask-wearing, to prevent the spread of COVID-19 (A. Taylor, 2020). Our findings point to certain explanations and approaches to consider for encouraging greater uptake of the individual-level protective actions that we know now are effective. (Dehning et al., 2020; Feng et al., 2020; N. H. L. Leung et al., 2020).

First, it is imperative that we encourage public trust in health experts. Trust is a critical factor in how a message is received by the public during a health emergency; prior research of influenza outbreaks reports that trust increases the perceived clarity of expert communication and is associated with adopting preventive behaviors (Quinn et al., 2013; Rubin et al., 2009). Public trust in the US health system had dropped sharply over the past 50 years (Blendon et al., 2014) and may have been further eroded by early mixed messages about the virus when scientific knowledge was still uncertain. Today, trust in experts continues to be undermined by contradictory messages emphasized by national political leaders (Cameron & Kaplan, 2020; Facher & Joseph, 2020). Key actors, such as respected physician leaders or agency directors, should increase their visibility across traditional and social media platforms to communicate consistent messages to the public regarding recommended actions. Where possible, partnering with local political leaders, for example, governors and county public health officials, may help the public gain trust in expert messages and reduce confusion regarding the appropriate actions to take. Engaging with trusted community leaders to help translate and communicate information may also foster a deeper sense of trust and confidence in the health system. This may be particularly important in Black and Hispanic or Latino communities where trust in the health professions is already low (Boulware et al., 2003) and that are disproportionately affected by COVID-19.

In addition to improving trust in health experts, improving risk communication around the pandemic is vitally important. Our findings suggest that messaging should focus on modifying individual perceptions of the severity of COVID-19 and the benefits of taking recommended actions. Successful communication strategies might utilize personal stories highlighting the severity and impact of illness and presenting data, such as infection and mortality rates, tailored to subgroups to increase the personal relevance of taking protective actions. We also found that being Black or Hispanic was associated with undertaking fewer recommended actions. Although several important factors related to pervasive inequity and discrimination in the US likely contribute to this disparity, tailoring communication about severity, impact, and benefits to higher-risk groups will also be critical going forward.

Successful risk communication should also involve consistent use of simple and brief messages on concrete actions individuals can feasibly undertake. Particularly during disasters, the public may be overwhelmed into inaction by complex messaging around recommended actions. As one example of simplifying a critical recommendation, Dr. Lucy Jones, a seismologist well known for her earthquake safety messaging, suggests "don't share your air" as a clear message that focuses on action, while encapsulating the importance of mask-wearing to reduce personal and community risk of virus transmission (Lelyveld, 2020).

Among our respondents, wearing a mask when going out was infrequently endorsed, whereas, in contrast, washing hands was commonly undertaken. This likely reflects the current recommendations early in the pandemic when basic hygiene was overwhelmingly emphasized as protective against COVID-19, and recommendations around mask-wearing were conflicting (Goodnough & Sheikh, 2020; Shear & Kaplan, 2020). Today, a growing body of evidence regarding the effectiveness of face coverings at slowing disease spread (Chu et al., 2020) supports regular mask-wearing in public, as many states have now mandated. Still, the American public remains sharply divided on mask-wearing, with many, including the President, publicly refusing to wear masks (T. Smith, 2020; A. Taylor, 2020). Inconsistent messaging received early in the pandemic, in part due to a lack of national leadership but also due to rapidly changing information as scientific knowledge about this novel virus grew, may have exacerbated the ongoing debate about mask-wearing. This underscores the importance of transparency about scientific uncertainties for building public trust.

As our study highlights, the role of trust in influencing protective behaviors is complex and still emerging in the context of COVID-19. An array of psychosocial factors, such as fear, empathy, depressed mood and affect, and altruism, as well as contextual factors, such as government systems, physical isolation, and political and community orientation, likely play a role in the relationship between trust and behavioral intention (Pfattheicher et al., 2020). A recent study using a cross-sectional online public survey in Kuwait found that trust in government was positively associated with protective behavior intentions due to increased feelings of social cohesion, inclusion, and community (Al-Rasheed, 2020). The authors also suggested that as conflicting official messages regarding the pandemic and recommended actions increased, feelings of distrust, confusion, and attention fatigue would likely reduce the likelihood of undertaking protective behaviors. Another recent study examined the interplay between trust, fear, and optimism–pessimism in the context of COVID-19 and found that optimists and those with high levels of trust demonstrated lower levels of fear and more engagement in preventive behaviors (Jovančević & Milićević, 2020). Still, other factors, such as perceptions of self-efficacy and knowledge, likely also play an important role in facilitating compliance via an institutional trust (see e.g., https://psyarxiv.com/uzwgf/ for preliminary data). Our study addresses a single but important mechanism for trust

in authorities to impact protective behaviors during COVID-19, through perceptions of severity and benefits. This relationship is particularly stark against the sociopolitically divided backdrop of today's United States and without a course correction, will likely continue to exacerbate the uncontrolled pandemic in this country. Future research should continue to consider the role of the myriad other factors that likely influence behavioral intention and compliance during pandemics, including how both general and specific trust is modified by these factors.

Limitations

Our findings should be considered in the context of certain limitations. We conducted a cross-sectional survey study of a rapidly evolving health emergency. Since we fielded our survey, much has changed, including what we know about the virus and its transmission and the effectiveness of various interventions. Perceptions of individual- and community-level risk have also likely changed over time, as places like New York City have emerged from a brutal first wave and maintained a declining slope of cases and deaths, whereas other cities have begun a steep first climb. It is possible that the observed impact of each variable in our study on actions taken may have shifted over time, but the pathways by which they exert influence likely remain the same. A longitudinal study of how the trust in experts and political leadership, as well as perceptions of risk and shift over time, could elucidate new strategies for encouraging uptake of recommended actions.

Our sample drawn from the MTurk platform was overrepresented by younger, white educated males, and as such our findings may not be generalizable. Other studies that have used MTurk to recruit participants have also resulted in samples that are overwhelmingly younger, more educated, and more male than the US population as a whole (Casey et al., 2017; Huff & Tingley, 2015; Levay et al., 2016). Although this is more diverse than traditional college student sample pools that are often utilized in behavioral research, the college population is also fairly homogenous (Chandler et al., 2019). Another limitation with the use of MTurk is that participants drawn from this pool are likely to have completed similar survey studies of the pandemic at the same time, priming them and leading to concerns of nonnaivete, which can potentially compromise data quality. Despite these concerns regarding the representativeness of the MTurk population (Huff & Tingley, 2015), MTurk is increasingly being used in research as a way to quickly and efficiently recruit large numbers of individuals to complete surveys (Chandler & Shapiro, 2016). We used MTurk to efficiently recruit participants to capture their real-time perceptions of the pandemic under uncertain and rapidly changing circumstances. Using the MTurk platform allowed us to gather data quickly and early in the pandemic, providing a baseline understanding of the interrelationships between key factors, and point to opportunities for facilitating greater public uptake of recommended protective action. Future research may seek to more definitively establish these relationships.

Finally, because we wanted to field the survey as early in the pandemic as possible to capture a real-time snapshot of initial perceptions, beliefs, and actions around COVID-19, we were unable to engage in a robust survey development process. As a result, some of our core items, such as perceptions of susceptibility and severity of COVID-19, were developed de novo without the benefit of cognitive testing to ensure comprehension and interpretability, which could have affected data quality. However, to the extent possible, we used survey items that were either already tested or derived from tested items and used a research team consensus process to implement any item modifications.

Importantly, a key strength of this study is that we assessed individuals' perceptions and behaviors in real-time, providing a unique opportunity to understand actual rather than hypothesized behaviors during a pandemic. Indeed, prior studies exploring risk perceptions and precautionary behaviors in hypothetical pandemic situations report much more optimistic results than we found (Sadique et al., 2007). It is likely that individuals overestimate their ability to perceive risk and consequently take recommended actions during a public health emergency; our study sheds light on what people actually perceive and do during a pandemic.

Our study suggests potentially important directions for future work. Though our findings highlight the role that trust in experts and government played in motivating appropriate individual response to the COVID-19 pandemic, future work might usefully examine the extent to which trust in these key actors changes over time, including after the pandemic is contained. Other work (Albrecht, 2017) has found that rarely have natural disasters had a sustained impact on overall trust in government, suggesting somewhat hopefully that each disaster offers a new opportunity for trusted actors to influence an effective response. The nature of the trust relationship is also of importance for future scholarship. For example, to what extent do individuals view local health officials, their doctors, and public health workers as "trusted partners" in the effort to respond to a public health emergency, versus "trusted advisors" who instead are a locus of specialized expertise otherwise inaccessible to the general public, and what is the impact of these differing operationalizations of trust on the decision to implement recommended protective actions (Human & Provan, 2000; Kenis et al., 2019)? Finally, though we examine a commonly studied crisis topic, our work highlights the role of political leadership and trusted decision makers in public health crises, which are surprisingly less frequently represented in the scholarly literature on disasters (Kuipers & Welsh, 2017). Given the common challenges faced—and in some cases, exacerbated—by governments around the world in attempting to bring the COVID-19 pandemic under control, these key roles and transboundary relationships warrant closer examination in the unique context of this crisis.

CONCLUSION

A key takeaway from our online survey study conducted at the outset of the COVID-19 pandemic in the United States is that trust in health experts like the U.S. CDC and WHO can play an important direct role in encouraging individuals to undertake recommended actions like mask-wearing to protect against transmission. Having trust in health experts also facilitates the uptake of recommended public health measures by increasing perceptions of the severity of COVID-19 and the benefits of taking these actions. More than 9 months into the pandemic in the United States, the nation seems more divided than ever about how to contain the spread of coronavirus and mitigate its impact on our health and economy. Even as the country grapples with a sweeping third wave and many states are seeing alarming spikes in cases and hospitalizations, and have started to reinstate curfews and shutdowns, still, others contest the need for public health measures, mask-wearing continues to be hotly debated; cohesive and centralized political leadership is lacking and health expert warnings appear to go unheeded. Now is a critical time to emphasize in all public communication the severity and impact of COVID-19 to individuals and communities while spreading a few simple, consistent messages about protective actions individuals must take and working to rebuild trust through transparency in the health experts who can safely guide us through this pandemic.

CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

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REFERENCES

AJMC Staff. 2020. "A Timeline of COVID-19 Developments in 2020." *American Journal of Managed Care*, accessed November 25, 2020. https://www.ajmc.com/view/a-timeline-of-covid19-developments-in-2020

Albrecht, Frederike. 2017. "Government Accountability and Natural Disasters: The Impact of Natural Hazard Events on Political Trust and Satisfaction With Governments in Europe." *Risk, Hazards & Crisis in Public Policy* 8(4): 381–410.

Al-Rasheed, Malak. 2020. "Protective Behavior Against COVID-19 Among the Public in Kuwait: An Examination of the Protection Motivation Theory, Trust in Government, and Sociodemographic Factors." *Social Work in Public Health* 35(7): 546–56.

Ashbaugh, Andrea R., Christophe F. Herbert, Elena Saimon, Nelson Azoulay, Lening Olivera-Figueroa, and Alain Brunet. 2013. "The Decision to Vaccinate or Not During the H1N1 Pandemic: Selecting the Lesser of Two Evils? *PLOS One* 8(3): e58852.

Bateman, Julie M., and Bob Edwards. 2002. "Gender and Evacuation: A Closer Look at Why Women are More Likely to Evacuate for Hurricanes." *Natural Hazards Review* 3: 107–17.

Berinsky, Adam J., Gregory A. Huber, and Gabriel S. Lenz. 2012. "Evaluating Online Labor Markets for Experimental Research: Amazon.com's Mechanical Turk." *Political Analysis* 20(3): 351–68.

Bish, Alison, and Susan B. Michie. 2010. "Demographic and Attitudinal Determinants of Protective Behaviours During a Pandemic: A Review." *British Journal of Health Psychology* 15(Pt 4): 797–824.

Blendon, Robert J., John M. Benson, and Joachim O. Hero. 2014. "Public Trust in Physicians—U.S. Medicine in International Perspective." *New England Journal of Medicine* 371(17): 1570–72.

Boulware, Ebony L., Lisa A. Cooper, Lloyd E. Ratner, Thomas A. LaVeist, and Neil R. Powe. 2003. "Race and trust in the health care system." *Public Health Reports (Washington, DC: 1974)* 118(4): 358–65.

Brienen, Nicole C.J., Aura Timen, Jacob Wallinga, Jim E. van Steenbergen, and Peter F.M. Teunis. 2010. "The Effect of Mask Use on the Spread of Influenza During a Pandemic." *Risk Analysis* 30(8): 1210–18.

Bults, Marloes, Desiree J.M.A. Beaujean, Jan J. Richardus, and Helene A.C.M. Voeten. 2015. "Perceptions and Behavioral Responses of the General Public During the 2009 Influenza A (H1N1) Pandemic: A Systematic Review." *Disaster Medicine and Public Health Preparedness* 9(2): 207–19.

California Department of Public Health. 2020. "CDPH Guidance for the Prevention of COVID-19 Transmission for Gatherings." State of California—Health and Human Services Agency, accessed January 13, 2021. https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/COVID-19/Guidance-for-the-Prevention-of-COVID-19-Transmission-for-Gatherings-November-2020.aspx

Cameron, Chris, and Sheila Kaplan. 2020. "White House Blames Rise in Virus Cases on More Testing, as Experts Dispute the Claim." *The New York Times*, June 28, 2020. https://www.nytimes.com/2020/06/28/us/politics/coronavirus-sunday-talk-shows.html

Casey, Logan S., Jesse Chandler, Adam S. Levine, Andrew Proctor, and Dara Z. Strolovitch. 2017. "Intertemporal Differences Among MTurk Workers: Time-Based Sample Variations and Implications for Online Data Collection." *SAGE Open* 7(2): 2158244017712774.

Cassese, Erin C., Leonie Huddy, Todd K. Hartman, Lilliana Mason, and Christopher R. Weber. 2013. "Socially Mediated Internet Surveys: Recruiting Participants for Online Experiments." *PS: Political Science and Politics* 46(4): 775–84.

Centers for Disease Control and Prevention. 2020a. "Coronavirus Disease 2019 (COVID-19) Cases in the U.S." National Center for Immunization and Respiratory Diseases (NCIRD), Division of Viral Diseases, accessed June 30, 2020. https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html

Centers for Disease Control and Prevention. 2020b. "How to Protect Yourself & Others." National Center for Immunization and Respiratory Diseases (NCIRD), Division of Viral Diseases, accessed January 13, 2020. https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html

Champion, Victoria, and Celeste S. Skinner. 2008. "The Health Belief Model." In *Health Behavior and Health Education*, edited by Karen Glanz, Barbara K. Rimer and K. Viswanath, 45–65. San Francisco, CA: Jossey-Bass.

Chandler, Jesse, and Danielle Shapiro. 2016. "Conducting Clinical Research Using Crowdsourced Convenience Samples." *Annual Reviews in Clinical Psychology* 12: 53–81.

Chandler, Jesse, Cheskie Rosenzweig, Aaron J. Moss, Jonathan Robinson, and Leib Litman. 2019. "Online Panels in Social Science Research: Expanding Sampling Methods Beyond Mechanical Turk." *Behavior Research Methods* 51(5): 2022–38.

Chen, Lynn Y., Elizabeth Flood-Grady, Austen Hentschel, Lauren Wright, Rahma Mkuu, Alyson Young, Magda Francois, et al. 2020. "A Qualitative Study of Pregnant Women's Perspectives on Antibiotic Use for Mom and Child: Implications for Developing Tailored Health Education Interventions." *Antibiotics (Basel)* 9(10): 704.

Chu, Derek K., Elie A. Akl, Stephanie Duda, Karla Solo, Sally Yaacoub, Holger J. Schunemann. 2020. "Physical Distancing, Face Masks, and Eye Protection to Prevent Person-to-Person Transmission of SARS-CoV-2 and COVID-19: A Systematic Review and Meta-Analysis." *The Lancet* 395(10242): 1973–87.

Darcy, Oliver. 2020. "How Fox News Misled Viewers About the Coronavirus." *CNN Business*, March 12, 2020. https://www.cnn.com/2020/03/12/media/fox-news-coronavirus/index.html

de Zwart, Onno, Irene K. Veldhuijzen, Gillian Elam, Arja R. Aro, Thomas Abraham, George D. Bishop, Hélène A.C.M. Voeten, Jan Hendrik Richardus, and Johannes Brug. 2009. "Perceived Threat, Risk Perception, and Efficacy Beliefs Related to SARS and Other (Emerging) Infectious Diseases: Results of an International Survey." *International Journal of Behavioral Medicine* 16(1): 30–40.

Dehning, Jonas, Johannes Zierenberg, F. Paul Spitzner, Michael Wibral, Joao Pinheiro Neto, Michael Wilczek, Viola Priesemann, et al. 2020. "Inferring Change Points in the Spread of COVID-19 Reveals the Effectiveness of Interventions." *Science* 369(6500): eabb9789.

Dow, Kirstin, and Susan L. Cutter. 2000. "Public Orders and Personal Opinions: Household Strategies for Hurricane Risk Assessment." *Global Environmental Change Part B: Environmental Hazards* 2(4): 143–55.

Dupras, Charles, and Bryn Williams-Jones. 2012. "The Expert and the Lay Public: Reflections on Influenza A (H1N1) and the Risk Society." *American Journal of Public Health* 102(4): 591–95.

Facher, L., and A. Joseph. 2020. "Trump Says Covid-19 is 'Dying Out.' Experts Fear His Dismissiveness Could Prolong the Crisis." *StatNews.com*, June 18, 2020. https://www.statnews.com/2020/06/18/trump-dismissiveness-prolong-covid-19/

Farrell, Anne M., Jonathan H. Grenier, and Justin Leiby. 2017. "Scoundrels or Stars? Theory and Evidence on the Quality of Workers in Online Labor Markets." *Accounting Review* 92(1): 93–114.

Feng, Shuo, Chen Shen, Nan Xia, Wei Song, Mengzhen Fan, and Benjamin J. Cowling. 2020. "Rational Use of Face Masks in the COVID-19 Pandemic." *The Lancet Respiratory Medicine* 8(5): 434–36.

Ferguson, Neil M., Derek A.T. Cummings, Simon Cauchemez, Christophe Fraser, Steven Riley, Aronrag Meeyai, Sopon Iamsirithaworn, and Donald S. Burke. 2005. "Strategies for Containing an Emerging Influenza Pandemic in Southeast Asia." *Nature* 437(7056): 209–14.

Frieden, Thomas. 2020. "Former CDC Director: Covid-19 is Different from Flu and We Must Respond Differently." *CNN Health*. March 14, 2020. https://www.cnn.com/2020/03/14/health/coronavirus-covid-19-flu-comparison-frieden-analysis/index.html

Funk, Cary, Meg Hefferon, Brian Kennedy, and Courtney Johnson. 2019. "Trust and Mistrust in Americans' Views of Scientific Experts." *Pew Research Center; Science & Society*, August 2, 2019. https://www.pewresearch.org/science/2019/08/02/trust-and-mistrust-in-americans-views-of-scientific-experts/

Gabe, Thomas, Gene Falk, and Maggie McCarty. 2005. Hurricane Katrina: Social-Demographic Characteristics of Impacted Areas, CRS Report for Congress, RL33141.

Germann, Timothy C., Kai Kadau, Ira M. Longini Jr., and Catherine A. Macken. 2006. "Mitigation Strategies for Pandemic Influenza in the United States." *Proceedings of the National Academy of Sciences of the United States of America* 103(15): 5935–40.

Goldberg, Dan. 2020. "'It's going to disappear': Trump's changing tone on coronavirus." *Politico.com*, March 17, 2020. https://www.politico.com/news/2020/03/17/how-trump-shifted-his-tone-on-coronavirus-134246

Goodnough, Abby, and Knvul Sheikh. 2020. "CDC Weighs Advising Everyone To Wear a Mask." *The New York Times*, March 31. https://www.nytimes.com/2020/03/31/health/cdc-masks-coronavirus.html

Graham, James L., Lokesh Shahani, Richard M. Grimes, Christine Hartman, and Thomas P. Giordano. 2015. "The Influence of Trust in Physicians and Trust in the Healthcare System on Linkage, Retention, and Adherence to HIV Care." *AIDS Patient Care and STDS* 29(12): 661–67.

Gray-Graves, Amy, Keith W. Turner, and James H. Swan. 2011. "The Level of Willingness to Evacuate Among Older Adults." *Gerontology & Geriatrics Education* 32(2): 107–21.

Huang, Shih-Kai, Michael K. Lindell, Carla S. Prater, Hao-Che Wu, and Laura K. Siebeneck. 2012. "Household Evacuation Decision Making in Response to Hurricane Ike." *Natural Hazards Review* 13(4): 283–96.

Huff, Connor, and Dustin Tingley. 2015. "'Who are These People?' Evaluating the Demographic Characteristics and Political Preferences of MTurk Survey Respondents." *Research & Politics* 2(3): 2053168015604648.

Human, Sherrie E., and Keith G. Provan. 2000. "Legitimacy Building in the Evolution of Small-Firm Multilateral Networks: A Comparative Study of Success and Demise." *Administrative Science Quarterly* 45(2): 327–65.

Jacobs, Elizabeth A., Italia Rolle, Carol Estwing Ferrans, Eric E. Whitaker, and Richard B. Warnecke. 2006. "Understanding African Americans' Views of the Trustworthiness of Physicians." *Journal of General and Internal Medicine* 21(6): 642–47.

Jones, Christina L., Jakob D. Jensen, Courtney L. Scherr, Natasha R. Brown, Katheryn Christy, and Jeremy Weaver. 2015. "The Health Belief Model as an Explanatory Framework in Communication Research: Exploring Parallel, Serial, and Moderated Mediation." *Health Communication* 30(6): 566–76.

Jones, James H., and Marcel Salathé. 2009. "Early Assessment of Anxiety and Behavioral Response to Novel Swine-Origin Influenza A(H1N1)." *PLOS One* 4: e8032.

Jovančević, Ana, and Nebojsa Milićević. 2020. "Optimism-Pessimism, Conspiracy Theories and General Trust as Factors Contributing to COVID-19 Related Behavior—A Cross-Cultural Study." *Personality and Individivdual Differences* 167: 110216.

Kenis, Patrick, Lianne G.C. Schol, Marleen M. Kraaij-Dirkzwager, and Aura Timen. 2019. "Appropriate Governance Responses to Infectious Disease Threats: Developing Working Hypotheses." *Risk, Hazards & Crisis in Public Policy* 10(3): 275–93.

Kuipers, Sanneke, and Nicholas H. Welsh. 2017. "Taxonomy of the Crisis and Disaster Literature: Themes and Types in 34 Years of Research." *Risk, Hazards & Crisis in Public Policy* 8(4): 272–83.

Lazo, Jeffrey K., Ann Bostrom, Rebecca E. Morss, Julie L. Demuth, and Heather Lazrus. 2015. "Factors Affecting Hurricane Evacuation Intentions." *Risk Analysis* 35(10): 1837–57.

Lazo, Jeffrey K., Donald Waldman, Betty Morrow, and Jennifer Thacher. 2010. "Household Evacuation Decision Making and the Benefits of Improved Hurricane Forecasting: Developing a Framework for Assessment." *Weather and Forecasting* 25(1): 207–19.

Lelyveld, Nita. 2020. "Who Doesn't Trust Lucy Jones in a Crisis? Here's What She Has to Say About the Coronavirus Pandemic." *Los Angeles Times*, June 27, 2020. https://www.latimes.com/california/story/2020-06-27/who-doesnt-trust-dr-lucy-jones-in-a-crisis-heres-what-she-has-to-say-about-the-coronavirus-pandemic

Leung, Gabriel M., Lai-Ming Ho, Steve K.K. Chan, Sai-Yin Ho, John Bacon-Shone, Ray Y.L. Choy, Anthony J. Hedley, Tai-Hing Lam, and Richard Fielding. 2005. "Longitudinal Assessment of Community Psychobehavioral Responses During and After the 2003 Outbreak of Severe Acute Respiratory Syndrome in Hong Kong." *Clinical Infectious Diseases* 40(12): 1713–20.

Leung, Gabriel M., Tai-Hing Lam, Lai-Ming Ho, S.-Y. Ho, B.H.Y. Chan, I.O.L. Wong, and Anthony J. Hedley. 2003. "The Impact of Community Psychological Responses on Outbreak Control for Severe Acute Respiratory Syndrome in Hong Kong." *Journal of Epidemiology and Community Health* 57(11): 857–63.

Leung, Nancy H.L., Daniel K.W. Chu, Eunice Y.C. Shiu, Kwok-Hung Chan, James J. McDevitt, Benien J.P. Hau, Hui-Ling Yen, et al. 2020. "Respiratory Virus Shedding in Exhaled Breath and Efficacy of Face Masks." *Nature Medicine* 26(5): 676–80.

Levay, Kevin E., Jeremy Freese, and James N. Druckman. 2016. "The Demographic and Political Composition of Mechanical Turk Samples." *SAGE Open* 6(1): 2158244016636433.

Liao, Qiuyan, Benjamin Cowling, Wing Tak Lam, Man Wai Ng, and Richard Fielding. 2010. "Situational Awareness and Health-protective Responses to Pandemic Influenza A (H1N1) in Hong Kong: A Cross-Sectional Study." *PLOS One* 5(10): e13350.

Lindell, Michael K. 2012. "Response to Environmental Disasters." In *The Oxford Handbook of Environmental and Conservation Psychology*, edited by Susan D. Clayton, 391–412. Oxford, UK: Oxford University Press.

Lindell, Michael K., Jing-Chein Lu, and Carla S. Prater. 2005. "Household Decision Making and Evacuation in Response to Hurricane Lili." *Natural Hazards Review* 6(4): 171–79.

Longini, Ira M. Jr., Azhar Nizam, Shufu Xu, Kumnuan Ungchusak, Wanna Hanshaoworakul, Derek A. T. Cummings, and M. Elizabeth Halloran. 2005. "Containing Pandemic Influenza at the Source." *Science* 309(5737): 1083–87.

Lukoschek, Petra. 2003. "African Americans' Beliefs and Attitudes Regarding Hypertension and its Treatment: A Qualitative Study." *Journal of Health Care for Poor and Underserved* 14(4): 566–87.

MacKinnon, David P., Marcia P. Taborga, and Antonio A. Morgan-Lopez. 2002. "Mediation Designs for Tobacco Prevention Research." *Drug and Alcohol Dependence* 68(Suppl 1): S69–83.

Martins, David, and Keith Norris. 2004. "Hypertension Treatment in African Americans: Physiology is Less Important than Sociology." *Cleveland Clinical Journal of Medicine* 71(9): 735–43.

Morss, Rebecca E., and Mary H. Hayden. 2010. "Storm Surge and 'Certain Death': Interviews with Texas Coastal Residents Following Hurricane Ike." *Weather and Climate Society* 2: 174–89.

Murphy, Haley, Alex Greer, and Hao-Che Wu. 2018. "Trusting Government to Mitigate a New Hazard: The Case of Oklahoma Earthquakes." *Risk, Hazards, & Crisis in Public Policy* 9(3): 357–80.

Naylor, C. David, Cyril Chantler, and Sian Griffiths. 2004. "Learning from SARS in Hong Kong and Toronto." *Journal of American Medical Association* 291(20): 2483–87.

New York State Department of Health. 2020. "Travel, Larger Gatherings, and Quarantines." New York State, accessed January 13, 2021. https://coronavirus.health.ny.gov/travel-large-gatherings-and-quarantines

Norris, Fran H., Tenbroeck Smith, and Krzysztof Kaniasty. 1999. "Revisiting the Experience–Behavior Hypothesis: The Effects of Hurricane Hugo on Hazard Preparedness and Other Self-Protective Acts." *Basic and Applied Social Psychology* 21(1): 37–47.

Nuño, Miriam, Gerardo Chowell, and Abba B. Gumel. 2007. "Assessing the Role of Basic Control Measures, Antivirals and Vaccine in Curtailing Pandemic Influenza: Scenarios for the US, UK and the Netherlands." *Journal of Royal Society Interface* 4(14): 505–21.

Padilla, Mariel. 2020. "Who's Wearing a Mask? Women, Democrats and City Dwellers." *The New York Times*, June 2, 2020. https://www.nytimes.com/2020/06/02/health/coronavirus-face-masks-surveys.html

Paek, Hye-Jin, Karen Hilyard, Vicki S. Freimuth, J. Kevin Barge, and Michele Mindlin. 2008. "Public Support for Government Actions During a Flu Pandemic: Lessons Learned from a Statewide Survey." *Health Promotion Practice* 9(4 Suppl): 60S–72S.

Perez, Matt. 2020. "Gallup Poll: Most Americans Still Want Decreases In Coronavirus Cases Before Returning To 'Normal'." *Forbes*, April 30, 2020. https://www.forbes.com/sites/mattperez/2020/04/30/gallup-poll-most-americans-still-want-decreases-in-coronavirus-cases-before-returning-to-normal/#663fca12742b

Peters, Rosalind M., Karen J. Aroian, and John M. Flack. 2006. "African American Culture and Hypertension Prevention." *Western Journal of Nursing Research* 28(7): 831–54 discussion 855–863.

Pfattheicher, Stefan, Laila Nockur, Robert Böhm, Claudia Sassenrath, and Michael Bang Petersen. 2020. "The Emotional Path to Action: Empathy Promotes Physical Distancing and Wearing of Face Masks During the COVID-19 Pandemic." *Psychological Science* 31(11): 1363–73.

Plough, Alonzo, Benjamin Bristow, Jonathan Fielding, Stephanie Caldwell, and Sinan Khan. 2011. "Pandemics and Health Equity: Lessons Learned from the H1N1 Response in Los Angeles County." *Journal of Public Health Management and Practice* 17(1): 20–7.

Quinn, Sandra C., John Parmer, Vicki S. Freimuth, Karen M. Hilyard, Donald Musa, and Kevin H. Kim. 2013. "Exploring Communication, Trust in Government, and Vaccination Intention Later in the 2009 H1N1 Pandemic: Results of a National Survey." *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 11(2): 96–106.

Reininger, Belinda M., Sartaj Raja Alam, Ana Sanchez Carrasco, Zhongxue Chen, Barbara Adams, Joseph McCormick, and Mohammad H. Rahbar. 2013. "Intention to Comply with Mandatory Hurricane Evacuation Orders Among Persons Living Along a Coastal Area." *Disaster Medicine and Public Health Preparedness* 7(1): 46–54.

Resnick, Brian. 2020. "Covid-19 is Not the Flu. It's Worse." *Vox.com*, March 13, 2020. https://www.vox.com/science-and-health/2020/3/13/21176735/covid-19-coronavirus-worse-than-flu-comparison

Riley, Stephen, Christophe Fraser, Christl A. Donnelly, Azra C. Ghani, Laith J. Abu-Raddad, Anthony J. Hedley, Gabriel M. Leung, et al. 2003. "Transmission Dynamics of the Etiological Agent of SARS in Hong Kong: Impact of Public Health Interventions." *Science* 300(5627): 1961–66.

Rubin, G. James, Richard Amlot, Lisa Page, and Simon Wessely. 2009. "Public Perceptions, Anxiety, and Behaviour Change in Relation to the Swine Flu Outbreak: Cross Sectional Telephone Survey." *British Medical Journal (Clinical Research Edition)* 339: b2651.

Saad, Lydia. 2020. "The U.S. Remained Center-Right, Ideologically, in 2019." *Gallup*, January 9, 2020. https://news.gallup.com/poll/275792/remained-center-right-ideologically-2019.aspx

Sadique, M. Zia, W. John Edmunds, Richard D. Smith, William Jan Meerding, Onno de Zwart, Johannes Brug, and Philippe Beutels. 2007. "Precautionary Behavior in Response to Perceived Threat of Pandemic Influenza." *Emerging Infectious Disease Journal* 13(9): 1307–13.

Scherr, Courtney L., Jakob D. Jensen, and Katheryn Christy. 2017. "Dispositional Pandemic Worry and the Health Belief Model: Promoting Vaccination During Pandemic Events." *Journal of Public Health (Oxford)* 39(4), e242–50.

Shear, Michael D., and Sheila Kaplan. 2020. "A Debate Over Masks Uncovers Deep White House Divisions." *The New York Times*, April 3, 2020. https://www.nytimes.com/2020/04/03/us/politics/coronavirus-white-house-face-masks.html

Siegrist, Michael, Timothy C. Earle, and Heinz Gutscher. 2003. "Test of a Trust and Confidence Model in the Applied Context of Electromagnetic Field (EMF) Risks." *Risk Analysis* 23(4): 705–16.

Sim, Shin W., Kirm S.P. Moey, and Ngiap C. Tan. 2014. "The Use of Facemasks to Prevent Respiratory Infection: A Literature Review in the Context of the Health Belief Model." *Singapore Medical Journal* 55(3): 160–67.

Skinner, Celeste S., Jasmin Tiro, and Victoria L. Champion. 2015. *The Health Belief Model. Health Behavior: Theory, Research, and Practice* (5th edition, pp. 75–94). San Francisco, CA: Jossey-Bass.

Smith, Richard D. 2006. "Responding to Global Infectious Disease Outbreaks: Lessons From SARS on the Role of Risk Perception, Communication and Management." *Social Science & Medicine* 63(12): 3113–23.

Smith, Tovia. 2020. "The Battle Between the Masked and the Masked-Nots Unveils Political Rifts." *NPR*, May 29, 2020. https://www.npr.org/2020/05/29/864515630/the-battle-between-the-masked-and-the-masked-nots-unveils-political-rifts

Stein, Robert M., Leonardo Dueñas-Osorio, and Devika Subramanian. 2010. "Who Evacuates When Hurricanes Approach? The Role of Risk, Information, and Location." *Social Science Quarterly* 91(3): 816–34.

Stewart, Anita, Ron D. Hays, and John E. Ware. 1992. "Health Perceptions, Energy/Fatigue, and Health Distress Measures." In *Measuring Functioning and Well-being: The Medical Outcomes Study Approach*, edited by Anita L. Stewart and John E. Ware, 143–72. Durham, NC: Duke University Press.

Taylor, Adam. 2020. "How the Split Over Masks Sums up America's Chaotic Coronavirus Response." *The Washington Post*, June 25, 2020. https://www.washingtonpost.com/world/2020/06/25/face-masks-america-divided/

Taylor, Karen, Susanna Priest, Hilary Fussell Sisco, Stephen Banning, and Kenneth Campbell. 2009. "Reading Hurricane Katrina: Information Sources and Decision-Making in Response to a Natural Disaster." *Social Epistemology* 23(3–4): 361–80.

Taylor, Mel, Wendy Joung, Barbara Griffin, David Hill, Robert Chisari, Beryl Hesketh, and Beverley Raphael. 2011. "The Public and a Radiological or Nuclear Emergency Event: Threat Perception, Preparedness, and Anticipated Response—Findings from a Preliminary Study in Sydney, Australia." *Australian Journal of Emergency Management* 26: 31–9.

Teasdale, Emma, and Lucy Yardley. 2011. "Understanding Responses to Government Health Recommendations: Public Perceptions of Government Advice for Managing the H1N1 (Swine Flu) Influenza Pandemic." *Patient Education and Counseling* 85(3): 413–18.

Thompson, Dennis. 2020. "Is Coronavirus Really Like the Flu? Here's a Comparison." *U.S. News*, March 3, 2020. https://www.usnews.com/news/health-news/articles/2020-03-02/is-coronavirus-really-like-the-flu-heres-a-comparison

Trachtenberg, Felicia, Elizabeth Dugan, and Mark A. Hall. 2005. "How Patients' Trust Relates to Their Involvement in Medical Care." *Journal of Family Practice* 54(4): 344–52.

van Genugten, Marianne L.L., Marie-Louise A. Heijnen, and Johannes C. Jager. 2003. "Pandemic Influenza and Healthcare Demand in the Netherlands: Scenario Analysis." *Emerging Infectious Diseases* 9(5): 531–38.

Vaughan, Elaine, and Timothy Tinker. 2009. "Effective Health Risk Communication About Pandemic Influenza for Vulnerable Populations." *American Journal of Public Health* 99(Suppl 2): S324–32.

Younis, Mohamed. 2020. "Health Institutions Still Rated Best for COVID-19 Response." *Gallup*, May 1, 2020. https://news.gallup.com/poll/309614/health-institutions-rated-best-covid-response.aspx

Zhang, F., R.E. Morss, J.A. Sippel, T.K. Beckman, N.C. Clements, N.L. Hampshire, J.N. Harvey, et al. 2007. "An In-Person Survey Investigating Public Perceptions of and Responses to Hurricane Rita Forecasts along the Texas Coast." *Weather and Forecasting* 22(6): 1177–90.

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