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Fevered Reasoning: How Heightened Distress and Lowered Resources Relate to COVID-19 Beliefs

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Supplementary Materials: Data, Materials [see Index of Supplementary Materials]

Abstract

COVID-19 spawned many bogus beliefs (e.g., that it could be treated by ingesting household cleaners) and induced resistance to established facts (e.g., that it could be managed by vaccines). We tested whether transitory distress and insufficient psychosocial resources explain these maladaptive perspectives. According to the Resources and Perception Model (RPM; Harber et al., 2011, https://doi.org/10.1037/a0023995), distress distorts perception and judgment, but psychosocial resources (e.g., social support, self-esteem, purpose) mitigate such distortions by buffering distress. Two cross-sectional studies of COVID-19 beliefs fit within the RPM framework. General life distress was related to endorsing bogus beliefs and denying facts. COVID-specific distress was also related to bogus beliefs but not to denial of facts. Resources, in contrast, were associated with fewer bogus beliefs and with greater acceptance of facts. As per RPM, distress mediated the relation between resources and bogus beliefs. Additionally, rejection of CDC recommendations and adoption of survivalist strategies were positively associated with distress and negatively associated with resources. All results were retained even after controlling for mood and individual differences including political ideology and news sources.

Keywords

bogus beliefs, denialism, resources, distress, COVID-19, coping

Non-Technical Summary

Background:
The COVID-19 pandemic spawned many bogus beliefs, including conspiracy theories, unsupported and often unsound medical advice, and spiritual/theological explanations for the pandemic. These beliefs include, for example, that the pandemic arrived via asteroid or that it is a hoax designed to manipulate the stock market; that it can be cured by inhaling though a hair blower or by rubbing crystals; and that it portends the end of days. The pandemic also induced resistance toward scientifically valid information, such as the efficacy of COVID-19 vaccines. This rise of bogus beliefs and factual denialism often follow collective disasters.

Why was this study done?
This research explored causes of the bogus beliefs and factual denial following the COVID-19 pandemic and employed the Resources and Perception Model (RPM; Harber et al., 2011) to do so. According to RPM, distress can distort perception and

judgment, but psychosocial resources can correct these distortions by mitigating distress. Psychosocial resources are personal attributes and social conditions that help people cope with stressors. They include social support, self-worth/self-esteem, purpose, and other such sources of coping. The current set of studies tested if people with greater distress were more prone toward bogus beliefs and denialism, and if those with more resources avoided these tendencies.

What did the research find?

Results from Studies 1 and 2 showed that people with more COVID-related distress and more personal distress were more likely to endorse bogus beliefs and to engage in survivalist activities, such as purchasing firearms. The relation between distress and bogus beliefs was remarkably high (*r*s = .71-.75), suggesting that bogus beliefs might be a diagnostic of psychological distress. COVID distress and personal distress unexpectedly diverged regarding factual beliefs and CDC compliance. People with more personal distress were more likely to deny facts and resist CDC guidelines, but those with more COVID distress showed the opposite pattern; greater acceptance of facts and increased CDC compliance. We speculate that COVID-related distress might engender a coping-opportunism, where any beliefs or activities that might advance coping are pursued.

Study 2, which included psychosocial resource measures, found that people with ample resources were less likely to hold bogus beliefs regarding COVID and were more likely to accept COVID-related facts. Resources were also related to greater CDC compliance and less survivalist engagement. Study 2 also found that the negative relation between resources and bogus beliefs was itself mediated by a reduction in personal distress and COVID-related distress. These findings accord with the Resources and Perception Model.

What do these findings mean?

Major negative events often spawn extreme and unfounded beliefs, and resistance to facts. It can be tempting to attribute these distorted outlooks to troubled personalities or to malevolent motives. This research provides an alternative explanation. When scared and uncertain, people often seek relief in simplifying beliefs that connect negative events to concrete and tractable causes, and that validate personal ideologies. However, and as RPM predicts, people with greater psychosocial resources are better able to manage distress. As a result, they are less susceptible to bogus beliefs and more accepting of facts—even facts that are complex, that might contest pre-existing beliefs, or that are otherwise unsatisfying. These findings suggest that in future disasters, government agencies might give greater consideration to preserving and enhancing people's resources, for example by instituting more crisis support resources. Mental health providers might pay attention to extreme beliefs and factual denialism as signs of underlying distress.

COVID-19 spawned a flood of bogus beliefs. Some were relatively innocuous, such as that the disease arrived via asteroid (Gohd, 2020) or that it could be treated by breathing through a hair blower (Dunlop, 2020). Some were sinister, attributing the illness to shadowy groups seeking wealth or power (Anti-Defamation League, 2020). And some beliefs were dangerous, such as that COVID-19 could be cured by ingesting household cleaners (Slotkin, 2020). Compounding the problem of bogus beliefs was resistance to facts, such as refuting the efficacy of COVID-19 vaccines. Collectively, these unfounded beliefs and factual denialism constituted an "infodemic" that distracted people from earnest science, weakened their compliance with medical guidelines, and aggravated social divisions (Broniatowski et al., 2020).

Why do people adopt beliefs that range from the whimsical to the lethal, why do they resist potentially life-saving information, and how can such tendencies be checked? The present research drew on the Resources and Perception Model (RMP: Harber et al., 2011) to address these questions. According to RPM, distress can warp the ways stressors are perceived and judged, but psychosocial resources, which buffer stress, can correct those distortions. These RPM dynamics, applied to the COVID-19 crisis, suggest that distress arising from the pandemic or from life in general could promote bogus beliefs and resistance to authoritative information. However, psychosocial resources might reduce these distortions and would do so by buffering distress. Two cross-sectional studies tested these RPM predictions in the context of COVID-19.

The Coping Functions of Distorted Beliefs

Disasters cause people to seek answers. Why did this event happen? Who is responsible? How can it be prevented? Beliefs, even dubious ones, can satisfy these needs to make sense of bad events (Douglas et al., 2017). They do so by placing disturbing events within the tenable boundaries of cause and effect. Once a cause is located solutions can be identified, actions can be taken, and outcomes anticipated (Tetlock, 2002). Bogus beliefs, in particular, provide an illusion of deep understanding (Andrade, 2020) and bolster feelings of certainty, coherence, safety, and autonomy (Haltinner & Sarathchandra, 2018). Bogus beliefs that target disliked persons or unpopular groups help to channel fears and focus grievances (Haltinner & Sarathchandra, 2018).

The needs that bogus beliefs satisfy—meaning and control—are so powerful that people will even discern order in randomness to restore those needs. For example, people lacking control detect coherent patterns in random dot arrays (Kay et al., 2009). The search for meaning and control likewise attracts people to conspiracy theories and supernatural beliefs (Kay et al., 2009). Bogus beliefs and illusory pattern perception are therefore regarded as rooted in a common need for order, especially when encountering chaos or threat (van Prooijen et al., 2018).

If bogus beliefs flourish under conditions of threat and uncertainty, then the COVID-19 pandemic may have been a hothouse for such beliefs. COVID-19 is physically hazardous; those who contract it can suffer severe symptoms, lasting debilitation, and even death. Until the advent of vaccines in Spring 2021, COVID-19 was difficult to combat or control. Its root causes were poorly understood, information about it was initially uncoordinated and confusing (Broniatowski et al., 2020), and its social, political, and economic repercussions were complicated and serious. In the US, governmental mismanagement of the pandemic early on further compromised epistemic trust (Yong, 2020). Sheltering in place and social distancing, which arrested the illness, also separated people from jobs, schooling, socializing, and other activities that bestow belongingness, structure, and purpose (Fullana et al., 2020).

COVID-19 therefore presented a near perfect storm of psychological threats; it was physically dangerous and difficult to combat, its origins and duration were unclear, it undermined faith in institutions, and it blocked the social and occupational avenues that can provide restorative sources of worthiness, belonging, and meaning. People cope better with adversity when they can determine its dimensions (Johnson et al., 2006), yet the causes, consequences, and duration of COVID-19 were unclear. Bogus beliefs should proliferate in such an environment and, as has been widely documented, they did.

Did Psychological Distress Induce COVID-Related Bogus Beliefs?

As mentioned, people often embrace bogus beliefs when facing adverse events. We therefore expected that pandemic-related bogus beliefs in the US would be related to pandemic-related distress. However, people may have also experienced distress for reasons unrelated to COVID such as relationships, work, or finances. If these more general sources of stress also aroused needs for simplifying and tractable explanations then they, too, might have contributed to COVID-related bogus beliefs. We therefore separately tested whether COVID-19-specific distress and general distress were related to bogus beliefs.

Did Psychological Distress Induce Factual Denialism?

The complement to bogus beliefs is resistance to facts, referred to as "denialism" (Uscinski et al., 2020). People sometimes deny facts to block the distress that discomforting information creates (Shepherd & Kay, 2012), a willful ignorance referred to as "the ostrich effect" (Haltinner & Sarathchandra, 2017). Denialism can also shield partisan loyalties, by deflecting facts that threaten unifying dogmas (Haltinner & Sarathchandra, 2017). Because distress amplifies threat, we expected that denialism would be greater among those enduring more distress.

Did Psychological Distress Affect Pandemic-Related Behavior?

The distress affecting COVID related beliefs might also affect COVID related behavior. The present research tested if this was so by examining compliance with Centers for Disease Control (CDC) COVID prevention guidelines and

engagement in survivalist strategies (e.g., obtaining firearms, locating escape routes to remote locations). CDC compliance reflects confidence in governmental authority, trust in science based directives, and faith in collective action. Survivalism reflects wariness towards governmental institutions and science, and loyalty to small, ideological groups (Smith & Thomas, 2021). We therefore expected that distress would be related to increased survivalism (as per Smith & Thomas, 2021) and reduced CDC compliance among our US sample.

Psychosocial Resources as an Antidote to Bogus Beliefs, Factual Denialism, and Related Behaviors

Psychosocial resources are conditions, attributes, and states that promote coping (Hobfoll, 2011). Prominent among them are self-esteem, social support, hope, optimism, and sense of purpose. Self-esteem is an anxiety buffer that helps people manage their emotions (Kim et al., 2017) and use their emotions as information (Harber, 2005). It also helps them evaluate stressors judiciously (Greenberg et al., 1986). Social support reduces physiological reactivity to stressors, and advances coping with crises (Taylor, 2011). Hope and optimism orient and organize behavior towards desired goals and sustain people through immediate hardship (Scheier et al., 1994; Snyder et al., 1991). Purposefulness improves quality of life and boosts morale (Bond & Feather, 1988).

RPM-related research shows that these resources help people perceive threatening things more accurately. People with greater social support see hills as less steep (Schnall et al., 2008) and menacing strangers as less large (Fessler & Holbrook, 2013). Those with more trait or more state self-esteem see hazardous elevations as less high and scary objects as less close (Harber et al., 2011). Resources also promote more equitable social judgment. Self-worth increases openness to critical feedback (Trope & Pomerantz, 1998) and to disturbing but valuable health information (Harris & Napper, 2005). Boosted self-worth allows people to accept their own inconsistencies, and thereby reduce face-saving rationalizations (Steele, 1988). Because resources mitigate defensive cognitions and distorted perceptions, we predicted that resources would be associated with fewer bogus beliefs regarding COVID-19 and greater acceptance of COVID-19 facts, as well as greater CDC compliance and less survivalism. Further, we believed that resources would produce these benefits by reducing distress.

Determining the Unique Effects of Distress and Resources on Bogus Beliefs

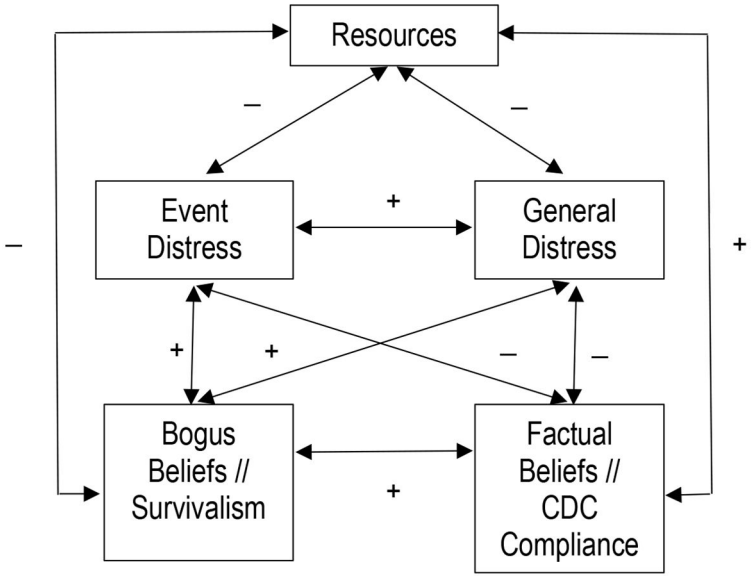
Attitudes and threat sensitivity can be affected by transient mood (Byrne & Eysenck, 1995; Schwarz et al., 1991). Erroneous beliefs and resistance to facts are related to individual differences including gender, ethnicity, education, political ideology, religiosity, and preferred news source (Hall Jamieson & Albarracin, 2020; Uscinski et al., 2020). We therefore co-varied mood and individual differences to determine the unique relations between distress, beliefs, and behavior and between resources, beliefs, and behavior.

Summary of Conceptual Framework and Predictions

This research was designed to show that epistemic responses to the COVID-19 pandemic, and response to collective crises in general, are shaped by distress (threat specific and general) and by psychosocial resources. Because this research is cross-sectional and correlational, our predicted relations are necessarily bi-directional. However, our underlying thesis is causal; that distress generates bogus beliefs and inhibits factual beliefs, but resources reverse these effects and do so by mitigating distress. Distress and resources are expected to similarly affect COVID-related behavior. Predicted relations between distress, resources, and beliefs and behaviors appear in Figure 1.

Figure 1

Predicted Relations Between Resources, Distress, and COVID-Related Beliefs and COVID-Related Behaviors



Study 1

Study 1 tested whether COVID-related distress and general distress were associated with increased susceptibility to COVID-related bogus beliefs and reduced acceptance of COVID-related facts.[1] It also tested if these sources of distress related to COVID-linked coping behaviors: CDC compliance and survivalism.[2]

Materials and Method

Participants (n = 350 US nationals) were recruited on Amazon Mechanical Turk ("MTurk") and were paid $0.75 for approximately 13 minutes of effort. Sixty-eight participants were excluded for failing attention checks, reporting dishonest responses, duplicate IP address, or completing the study in less than 5 minutes. The remaining sample (n = 282) was 40% female, average age = 36.95 (11.59).[3] This sample size exceeded the minimum (n = 196) required to confirm bivariate correlations and multiple regressions with two targeted predictors (COVID distress and general distress) and 14 covariates (anticipated effects of .05, p < .05, and Beta = .80).[4] The study was conducted in Spring 2020, when Donald Trump was the US president.

This research used four sources of self-report information: COVID related beliefs (bogus and factual), COVID related behaviors, distress (COVID-related and general), and covariate measures (mood, demographics, and ideology). These materials were initially developed in a pilot study enlisting MTurk participants (n = 152).[5] Pilot results established the internal reliability of these measures.[6]

1) For purposes of economy "bogus beliefs" refer to all three subtypes of bogus beliefs (political, medical, and spiritual) and "factual beliefs" refer to both types of factual beliefs (political and medical).

2) Note that all measures, manipulations, and exclusions in this study and in Study 2 are available in the Supplementary Materials.

3) A detailed demographic accounting of Study 1 participants appears in Supplemental Table 2.

4) Power calculated using *G-Power* online software.

5) See Supplemental Table 1 for Pilot Study demographics.

COVID-19 Related Beliefs and Attitudes

A wide range of measures was used to capture beliefs, distress, behaviors, resources, and demographics, as described below.[7] The Appendix outlines the conceptually central measures and the component measures that comprise them.

COVID-19 Beliefs Survey — This 41-item measure sampled bogus and factual beliefs concerning the Coronavirus. See Table 1 for sample items.[8]

Table 1

COVID-19 Beliefs Survey Sample Items

Sample
Bogus Beliefs
I. Socio-Political
The Coronavirus is a hoax, designed to control the stock market.
The national government is planning to create mass-quarantine camps for homeless people.
II. Medical
The Coronavirus can be prevented and/or cured by teas and essential oils.
Inhaling hot air from a hair dryer can reduce Coronavirus symptoms.
III. Spiritual
The Coronavirus is divine punishment for a world that has become sinful.
The Coronavirus crisis is the first part of the End Days.
Factual Beliefs
I. Socio-Political
The national government was insufficiently prepared for the Corona virus.
Many people are out of work because of the Coronavirus.
II. Medical
The spread of the Coronavirus can be reduced by thoroughly washing your hands.
A person can have the Coronavirus and not even feel ill.

Note. Response options range from 1 = "Not at all believable" to 5 = "Totally believable".

Bogus Beliefs — Bogus beliefs included three sub-scales: 1) Socio-political beliefs ("political beliefs"), consisting of 8 items falsely attributing the pandemic to corruption or mendacity (M = 2.23, SD = 0.94); 2) medical beliefs (α = .95), consisting of 6 items endorsing specious cures (M = 1.76, SD = 1.13); and 3) spiritual beliefs (α = .93), consisting of 5 items attributing the virus to supernatural causes, (M = 1.89, SD = 1.13). Bogus beliefs subscales were highly intercorrelated, rs ranging from .90 to .93, ps < .001 and comprised a reliable total bogus beliefs scale, α = .96.

Factual Beliefs — Factual beliefs included 12 valid propositions concerning COVID-19. The overall scale had satisfactory reliability, α = .81, (M = 4.16, SD = 0.59). Factual Beliefs was comprised of two intercorrelated subscales, $r(279)$ = .76, p < .001; socio-political facts, consisting of 5 valid statements regarding government action and social policy, α = .69, (M = 4.02, SD = 0.67) and medical facts, consisting of 7 valid statements regarding the nature and treatment of COVID-19, α = .74, (M = 4.27, SD = 0.62).

6) Pilot study details, including measurement development and complete scale parameters are available in the Supplementary Materials; "Supplemental Text: Pilot Study".

7) The survey packet also included three additional subscales addressing attraction to egalitarian leaders, authoritarian leaders, and authoritarian governance. Results, although consistent with anticipated relations with distress and resources, are not reported in order to retain focus on distress, resources, and beliefs.

8) See Supplementary Materials Table 1 for the complete COVID beliefs measure.

Fauci vs. Trump Regarding Hydroxychloroquine — Two items, separate from the COVID Beliefs Survey, asked whether participants agreed with 1) then-President Trump's endorsement of hydroxychloroquine as a COVID-19 treatment[9] or 2) with cautions about this drug expressed by Dr. Anthony Fauci, the then director of NIH/NIAID. A difference score, "Fauci – Trump", was created to reflect preference for scientifically-informed over politically-motivated judgments of this drug.

Survivalism — Six items addressed the degree to which participants endorsed survivalist responses to the pandemic such as banding with a small group of trusted others and obtaining firearms (Smith & Thomas, 2021). Survivalism increases during societal crises and is related to conspiracy beliefs (Fetterman et al., 2019).[10]

CDC Compliance — Five items addressed whether participants were following Centers for Disease Control (CDC) COVID-19 recommendations, including hand washing, social distancing, and limited visits to public spaces. CDC compliance would reflect acceptance of COVID-related facts, and implicate efforts to reduce risks to self and others.[11]

COVID-Related Distress — COVID-related distress refers to the emotional strain and life disruptions arising from and specific to the COVID-19 pandemic. It was assessed with the following three subscales.

Coronavirus Related Emotions — Fifteen items sampled the degree to which the COVID-19 crisis aroused negative emotions (e.g., fear, anxiety, annoyance) and positive emotions (e.g., appreciation, interest, amusement).[12]

Coronavirus Vulnerability — Four questions asked participants to estimate their relative odds of getting the illness and their comparative vulnerability to it.

Coronavirus Life Disruptions — Ten items inquired about COVID-19 related life disruptions.

General Distress — General distress refers to the emotional strain and physical symptoms arising from causes other than COVID-19. It was measured using the following two subscales.

General Life Stress — A set of 9 items regarding current life stresses (not specific to COVID), related to education, employment, relationships, health, and finances.

General Symptoms — A set of 12 items concerning physical symptoms unrelated to COVID indexed general physical well-being.

Mood and Individual Differences — COVID-19 beliefs and behaviors might be affected by transient psychological states, personal attributes, and personal beliefs unrelated to psychological distress. We therefore measured mood, demographics, and trusted news source to account for prominent covariates.

Current Mood — Participants rated the degree to which they currently felt happy, angry, anxious, calm, afraid, sad, lonely, annoyed, bored, and frustrated.[13]

9) Hydroxychloroquine was touted as a potential treatment for Covid-19, but NIH clinical trials (National Institutes of Health, 2020) indicated it was ineffective and potentially harmful.

10) See Supplemental Research Materials Table 2 for the complete measure.

11) See Supplemental Research Materials Table 3 for the complete measure.

12) Positive emotions did not resolve into a reliable scale and were therefore not included in subsequent analyses.

13) Four items concerning emotional disclosure and suppression were not included because they did not resolve into a reliable scale; see the Supplementary Materials for details.

Demographics — The demographics survey inquired about participants' age, gender, ethnicity, politics, religion, education, current living conditions (e.g., alone or with others), and about the region of the United States (e.g., Northeast, South, West, Midwest) and residence (e.g., city, town, suburb, rural) in which they lived.

Trusted News Sources — Participants rated their trust in a variety of liberal, conservative, and neutral news sources including print, broadcast, and internet media, and government leaders and agencies. People who rely on partisan news sources may be more susceptible to bogus beliefs (Mancosu & Vegetti, 2021).

Attention Checks — The survey packet included 3 attention checks plus a declaration of honest responding. Participants who failed any of the attention checks or admitted to dishonesty were omitted from subsequent analyses. Participants with duplicate IP addresses and those who spent less than 5 minutes on the study (indicating insufficient attention) were also excluded. These filters were included in Study 2.

Procedure

The study survey packet included the survey of COVID-19 beliefs, COVID-related attitudes and behaviors, measures of COVID-related and general distress, and measures of mood, demographics, and ideology. All continuous ratings used 5-point Likert scales (5 = highest endorsement) except for current stresses, which ranged from 1 to 7 (7 = highest endorsement). Participants completed the survey online after supplying written consent.

Results

Data Management

COVID-19 Beliefs Survey and COVID-Related Attitudes Subscales — Table 2 presents measurement parameters, Cronbach Alphas, and intercorrelations between the measures of bogus beliefs, factual beliefs, and COVID related behaviors. Total bogus beliefs and total factual beliefs produced satisfactory Alphas, as did their subscales. So, too, did CDC compliance and COVID-related survivalism. These results, which resembled those of our pilot study, reconfirmed the internal reliability of the COVID-19 Beliefs Survey and the associated attitudes measures, and no further changes were made to them. The finalized COVID Beliefs Survey, CDC Compliance scale and COVID survivalism measures appear in the Supplementary Materials.

COVID-Related Distress Scales — The 7 measures of COVID-related distress all had strong internal reliability and were highly intercorrelated. They were standardized and combined into a reliable omnibus COVID-Distress measure (α = .88; M = -.01, SD = 0.68).[14]

General Distress Scales — The two measures of general distress (current stress and general symptoms) were highly correlated (r = .68, p < .001) and formed a reliable omnibus General Distress measure (α = .81; M = -.02, SD = 0.91).[15]

Trusted News Sources — Trust in Left Wing news (α = .93), Trust in Right Wing news (α = .87), and Trust in Neutral news (α = .80) showed satisfactory to strong reliability.

14) Descriptive statistics and intercorrelations of COVID distress composite measures are in Supplemental Table 3.

15) Descriptive statistics and intercorrelations of general distress composite measures appear in Supplemental Table 4.

Table 2

Outcome Measures: Parameters and Intercorrelations, Study 1

Measure	*M*	*SD*	α	1	2	3	4	5	6	7	8	9
Bogus Beliefs												
1. Overall	2.48	1.19	.97	–								
2. Political	2.62	1.15	.93	.97***	–							
3. Medical	2.35	1.31	.94	.97***	.91***	–						
4. Spiritual	2.44	1.26	.92	.97***	.90***	.93***	–					
Factual Beliefs												
5. Overall	4.13	0.61	.85	-.37***	-.36***	-.36***	-.37***	–				
6. Political	4.15	0.66	.69	-.36***	-.34***	-.36***	-.37***	.92***	–			
7. Medical	4.12	0.63	.78	-.34***	-.34***	-.32***	-.33***	.96***	.76***	–		
8. Fauci vs. Trump	0.94	1.95	NA	-.44***	-.45***	-.42***	-.41***	.36***	.39***	.29***	–	
Behaviors												
9. CDC Compliance	4.26	0.66	.81	-.35***	-.33***	-.35***	-.34***	.63***	.59***	.59***	.27***	–
10. COVID Survivalism	3.04	0.98	.87	.66***	.65***	.63***	.64***	-.13*	-.15*	-.11†	-.40***	-.07

Note. Fauci vs. Trump = Difference in trust in CDC Dr. Anthony Fauci vs. trust in then President Trump regarding the efficacy of hydroxychloroquine. †$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Preliminary Analyses

Interrelations Between Bogus Beliefs, Factual Beliefs, and Behavior — The correlations between bogus beliefs, factual beliefs, and COVID-related behaviors aligned with our theoretical framework (see Table 2). Bogus beliefs and factual beliefs were negatively related to each other. Bogus beliefs were negatively related to CDC compliance and were positively related to survivalism; factual beliefs were positively related to CDC compliance and were negatively related to survivalism. Overall, these correlations indicate two distinct epistemic postures; one favoring confabulations, denialism, and "doomsday prepping" (e.g., stockpiling materiel and readying for self-sufficiency; Smith & Thomas, 2021); the other embracing factual information, resisting fabrication, and favoring collective coping.

Demographics and COVID-19 Beliefs and Behavior — COVID-related beliefs and behaviors were related to most of the covariate measures. Age and education were not significantly related to COVID-related beliefs or behaviors but were retained because they have been associated with bogus beliefs (e.g., Uscinski et al., 2020). These results confirm the relevance of our selected background variables.[16]

Primary Analyses: Distress and COVID-19 Beliefs and Behaviors

Bivariate Correlations — Bivariate correlations between COVID beliefs (bogus and factual) and the two forms of distress (COVID-related and general) appear in Table 3. The simple correlations between both types of distress and total bogus beliefs were remarkably high (*r*s exceeding .70). General distress was negatively related to factual beliefs, but COVID related distress was not. Both forms of distress were positively related to survivalist behaviors, but only general distress was related (negatively) to CDC compliance.

16) Details on the relations between covariate measures and principal outcomes appear in Supplemental Tables 5a-5c, and in the associated Supplemental Materials text.

Table 3

Bivariate Correlations Between COVID Beliefs, Attitudes, and Distress, Study 1

	Distress Measures	
Measures	**COVID Distress**	**General Distress**
Bogus Beliefs		
Total	.71***	.73***
Political	.71***	.72***
Medical	.68***	.72***
Spiritual	.68***	.70***
Factual Beliefs		
Total	-.09	-.33***
Political	-.10†	-.30***
Medical	-.08	-.32***
Fauci vs. Trump	-.17**	-.24***
Behaviors		
Survivalist Orientation	.54***	.45***
Follow CDC Guidelines	-.08	-.34***

Note. Fauci vs. Trump = Difference in trust in then-CDC Dr. Anthony Fauci vs. trust in then-President Trump regarding hydroxychloroquine efficacy. COVID Distress and General Distress are composites of standardized scales, with mean = zero.
†$p < .10$. **$p < .01$. ***$p < .001$.

Multiple Regressions — To assess the unique relations between distress and COVID beliefs, and between distress and COVID behaviors, a series of multiple regressions were conducted in which current mood, demographics, and ideological and informational variables were controlled. The regressions were structured into four models: Model 1 addressed current mood (positive and negative).[17] Model 2 addressed demographics (age, gender, ethnicity, education, cohabitation, region, and residence). Model 3 addressed ideology (political party, political orientation, religiosity, and trusted news sources). Model 4 addressed distress: COVID-related distress and general distress.[18]

Distress and COVID-Related Bogus Beliefs — COVID-related distress and general distress were both related to bogus beliefs even after controlling for mood and multiple demographic and ideological covariates (see Table 4). Effect sizes (based on R^2 change) were generally in the "medium" range, per Gravetter and Wallnau (2013).

Distress and COVID-Related Factual Beliefs — Contrary to expectations, COVID related distress and general distress had opposite associations with factual beliefs after controlling for mood, ideology, and demographics (see Table 5). Whereas general distress depressed acceptance of facts, COVID-related distress increased acceptance of facts.

Distress and COVID-Related Behaviors — The two distress types had differing associations with COVID-related behaviors (see Table 5). COVID-related distress was positively related to survivalist responses but also to higher CDC compliance. General distress was related to reduced CDC compliance and was unrelated to survivalism.

17) Current negative mood was highly correlated to both Covid-related distress, $r = .74$, $p < .001$ and general distress, $r = .68$, $p < .001$. Controlling for it likely made principal results more conservative.

18) Complete regression details for Study 1 appear in Supplemental Tables 6, 7, and 8.

Table 4

Relations Between Distress and COVID Bogus Beliefs Controlling for Covariates, Study 1

	Bogus Beliefs							
	Total		Political		Medical		Spiritual	
Predictor	**ΔR^2**	**β**	**ΔR^2**	**B**	**ΔR^2**	**β**	**ΔR^2**	**β**
Model 1: Mood	.49***		.44***		.49***		.46***	
Model 2: Demog.	.08***		.09*		.08*		.06**	
Model 3: Ideology	.15***		.14***		.15***		.16***	
Model 4: Distress	.08***		.08***		.07***		.08***	
COVID Distress		.23***		.30**		.16**		.20**
General Distress		.26***		.22***		.29***		.27***
Total R^2	.80		.75		.79		.75	
n	225		226		229		228	

Note. Mood includes current positive mood and current negative mood; Demog. = Demographics, and includes age, gender education, cohabitation, region, and residential area. Ideology includes political party, political orientation, religiosity, and news source.
$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 5

Relations Between Distress, COVID Factual Beliefs, and COVID-Related Behaviors, Controlling for Covariates, Study 1

	Factual Beliefs								Behaviors			
	Total		Political		Medical		Fauci vs. Trump		Survivalism		CDC Compliance	
Predictor	**ΔR^2**	**β**	**ΔR^2**	**B**	**ΔR^2**	**β**	**ΔR^2**	**β**	**ΔR^2**	**β**	**ΔR^2**	**β**
Model 1: Mood	.06**		.07***		.04**		.10***		.31***		.04*	
Model 2: Demog.	.10*		.10*		.08†		.07		.04		.14**	
Model 3: Ideology	.16***		.17***		.13***		.38***		.09***		.12***	
Model 4: Distress	.04**		.03*		.04**		.01		.03**		.06***	
COVID Distress		.25*		.23*		.23*		.16†		.26**		.21*
General Distress		-.31***		-.24*		-.33***		-.09		.02		-.40***
Total R^2	.36		.37		.30		.55		.47		.36	
n	226		228		227		229		228		228	

Note. Fauci vs. Trump = Difference in trust in CDC Dr. Anthony Fauci vs. trust in then President Trump regarding the efficacy of hydroxychloroquine. Mood includes current positive mood and current negative mood; Demog. = Demographics, and includes age, gender education, cohabitation, region, and residential area. Ideology includes political party, political orientation, religiosity, and news source.
$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Discussion

Study 1 confirmed that COVID distress and general distress were positively related to bogus beliefs even after controlling for mood, demographics, and ideology. Relations between the two distress types and factual beliefs, and between distress types and COVID-related behaviors, were more complicated. COVID distress was positively related to factual beliefs, survivalist strategies, and CDC compliance, while general distress was negatively related to these outcomes. These patterns recur in Study 2 and are addressed in the General Discussion.

Study 2

Study 2 had three goals: Reconfirm the associations between distress, beliefs, and behavior demonstrated in Study 1; demonstrate that resources are negatively related to bogus beliefs and survivalism, and are positively related to factual beliefs and CDC compliance, and; show that the associations between resources and beliefs, and between resources and behavior, are themselves mediated by distress. Study 2 tested these predicted *resources → distress → beliefs* paths using mediational models that simultaneously assessed the contributions of COVID related distress and general distress.

Materials and Method

Participants (n = 400 US nationals) were recruited on Amazon Mechanical Turk ("MTurk") and were paid $1.00 for approximately 14 minutes of effort. Participants were excluded (n = 97) for failing attention checks, reporting dishonest responses, duplicate IP address, or completing the study in less than 5 minutes. The remaining sample (n = 303) was 40% female, average age = 38.32 (12.38).[19] This sample size is greater than the 196 needed to test bivariate correlations and multiple regressions with two targeted predictors (COVID distress and general distress) or one predictor (Resources) and 14 covariates, anticipated effects of .05, $p < .05$, and Beta = .80.

Study 2 employed all the measures used in Study 1. It also included several standardized measures of general distress to better explore the unexpected dissociation between COVID distress and general distress. Study 2 also included a set of psychosocial resource measures.[20]

COVID Related Distress

The measures of COVID-Related Distress, COVID-Related Disruptions, and COVID vulnerability that were used in Study 1 were used again in Study 2.

General Distress

The measures of Current Life Stress and General Symptoms, as used in Study 1, were again used in Study 2. The following standardized measures of general distress were also employed.

Anxiety — Anxiety was measured using Spielberger's 20-item measure of state anxiety (Spielberger et al., 1983). Response range = 1-4.

Depression — Depression was measured using the Center for Epidemiologic Studies Depression Scale (CES-D), a 20-item self-report measure (Radloff, 1977). Response range = 1-4.

Fear of Hope — Fear of hope assesses the degree to which hope triggers fear. It is measured by a 6-item Fear of Hope scale (Harber et al., 2023). Response range = 1-5.

Psychosocial Resources Measures

Hope — Hope was measured using Snyder's Adult Hope Scale ("Hope", Snyder et al., 1991). Response range = 1-4.

Optimism — Optimism relates to positive future expectations but unlike hope (as defined by Snyder) it does not involve personal agency. Optimism was measured by the 10-item Life Orientation Test (LOT; Scheier et al., 1994). Response range = 1-5.

19) A detailed demographic accounting of Study 2 demographics appears in Supplemental Table 0.

20) Supplemental Table 10 presents all measures used in Studies 1 and 2, and details their sources, Cronbach Alphas, means and *SD*s, and studies in which they were used.

Purpose — Purpose was measured with Ryff's Purpose in Life scale (Ryff, 1989). Purpose is positively related to adaptive coping and to positive affect and is negatively related to dysphoria. Response range = 1-7.

Self-Esteem — Self-esteem was measured using Rosenberg's self-esteem measure (Rosenberg, 1965). Response range = 1-5.

Social Support — Perceived social support was measured using the 12 item Zimet et al. (1988) Multidimensional Scale of Perceived Social Support. Response range = 1-7.

Procedures

Procedures were identical to those used in Study 1, but with the additional measures.

Results

Data Management

Table 6 presents measurement parameters, Cronbach Alphas, and intercorrelations between measures of bogus beliefs, factual beliefs, and COVID related behaviors for Study 2. Omnibus measures of COVID-related distress, general distress, and resources were generated to economize analyses, as was done in Study 1.[21] Resources were negatively correlated to COVID-related distress, $r(286) = -.43$, $p < .001$ and to general distress, $r(264) = -.72$, $p < .001$, which is consistent with the buffering effect of resources on stress (e.g., Hobfoll, 2011). COVID-related distress and general distress were again highly correlated, $r(259) = .81$, $p < .001$.

Table 6

Outcome Measures: Parameters and Intercorrelations, Study 2

Measure	*M*	*SD*	α	1	2	3	4	5	6	7	8	9
Bogus Beliefs												
1. Overall	2.49	1.14	.97	–								
2. Political	2.66	1.12	.92	.97***	–							
3. Medical	2.36	1.26	.94	.97***	.90***	–						
4. Spiritual	2.42	1.21	.91	.95***	.87***	.90***	–					
Factual Beliefs												
5. Overall	4.10	0.61	.85	-.38***	-.36***	.39***	-.35***	–				
6. Political	4.11	0.67	.76	-.41***	-.38***	-.43***	-.38***	.90***	–			
7. Medical	4.09	0.64	.78	-.31***	-.30***	-.31***	-.28***	.95***	.71***	–		
8. Fauci vs. Trump	0.78	2.03	NA	-.46***	-.44***	-.47***	-.40***	.42***	.49***	.31***	–	
Behaviors												
9. CDC Compliance	4.17	0.64	.82	-.41***	-.39***	-.41***	-.38***	.62***	.55***	.59***	.35***	–
10. Covid Survivalism	3.03	0.99	.88	.67***	.68***	.61***	.64***	-.18**	-.21***	-.13*	-.38***	-.16**

Note. Fauci vs. Trump = Difference in trust in CDC Dr. Anthony Fauci vs. trust in then President Trump regarding the efficacy of hydroxychloroquine.
$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Preliminary Analyses

Demographics and COVID-19 Beliefs and Behavior — The relations between participant demographics and COVID-related beliefs, attitudes and behavior closely mirror those in Study 1, supporting the reliability of those initial findings.[22] The number and strength of these effects reconfirm their value as covariates for estimating the unique relations between deficits and resources, and COVID-related beliefs.

21) See Supplemental Tables 12-14 for summary statistics on the scales that comprise these omnibus measures, as well as their cross correlations.

22) See Supplemental Tables 14a-14d for summary statistics.

Correlations Between Bogus Beliefs, Factual Beliefs, and Behaviors — The relations between bogus beliefs, factual beliefs, and COVID-related behaviors mirror those in Study 1 (see Table 6). These patterns again describe distinct epistemic postures, one favoring bogus beliefs, denial of facts, and oriented towards doomsday prepping and the other resisting bogus beliefs, favoring facts, and oriented towards collective coping.

Primary Analyses: Distress, Resources, and COVID-19 Beliefs and Behaviors

Bivariate Correlations — Bivariate correlations between the omnibus coping metrics—COVID distress, general distress, and resources—and the measures of COVID-19 related beliefs and behaviors, appear in Table 7. These correlations, discussed below, are consistent with the expectations that distress disrupts, and resources bolster, accurate pandemic beliefs.

COVID Distress and General Distress — As in Study 1, the correlations between both sources of distress—COVID-related and general—and bogus beliefs were remarkably high, *r*s = .74 and .75, respectively. Study 2 correlations were a near mirror of those in Study 1, indicating that they are reliable. Both types of distress were negatively related to factual beliefs and to following CDC guidelines. Both distress types were positively related to survivalism.

Resources — People with ample resources endorsed bogus beliefs less and factual beliefs more than did people lacking resources. People with ample resources were more likely to follow CDC guidelines and less likely to endorse survivalism.

Table 7

Bivariate Correlations Between COVID Beliefs and Behaviors, and Distress and Resources, Study 2

	Distress and Resource Measures		
Measures	**COVID Distress**	**General Distress**	**Resources**
Bogus Beliefs			
Total	.74***	.75***	-.47***
Political	.74***	.75***	-.48***
Medical	.70***	.71***	-.43***
Spiritual	.68***	.70***	-.42***
Factual Beliefs			
Total	-.12*	-.28***	.42***
Political	-.13*	-.27***	.35***
Medical	-.09	-.26***	.42***
Fauci vs. Trump	-.24***	-.28***	.20**
Attitudes			
Survivalist Orientation	.61***	.56***	-.29***
Follow CDC Guidelines	-.21***	-.40***	.54***

Note. Fauci vs. Trump = Difference in trust in CDC Dr. Anthony Fauci vs. trust in then President Trump regarding the efficacy of hydroxychloroquine. COVID Distress and General Distress are composites of standardized scales, with means = zero.
**$p < .01$. ***$p < .001$.

Multiple Regressions — Multiple regressions, which controlled for mood and demographics, as well as ideological and informational influences, were again conducted to determine the unique effects of COVID-related distress, general distress, and resources. The Study 2 regressions followed the same four-model structure used in Study 1.[23]

23) See Supplemental Tables 15-20 for complete regression details.

Distress: Bogus Beliefs — Both COVID-related distress and general distress were positively associated with bogus political, medical, and spiritual beliefs related to the COVID pandemic (see Table 8). Results closely mirror those found in Study 1.

Table 8

Relations Between Distress and COVID Bogus Beliefs Controlling for Covariates, Study 2

	Bogus Beliefs							
	Total		Political		Medical		Spiritual	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Model 1: Mood	.50***		.50***		.44***		.47***	
Model 2: Demog.	.06*		.05*		.06*		.05*	
Model 3: Ideology	.14***		.13***		.16***		.11***	
Model 4: Distress	.10***		.09***		.10***		.09***	
COVID Distress		.23**		.27**		.24**		.12
General Distress		.36***		.31***		.35***		.41***
Total R^2	.79		.79		.75		.72	
n	226		227		227		226	

Note. Mood includes current positive mood and current negative mood; Demog. = Demographics, and includes age, gender education, cohabitation, region, and residential area. Ideology includes political party, political orientation, religiosity, and news source.
$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Distress: Factual Beliefs — COVID-related distress was associated with endorsement of COVID-related facts, and general distress was associated with denial of facts. Neither distress type affected crediting Fauci over Trump (see Table 9). These results also mirror Study 1.

Distress and Behavior — COVID-related distress and general distress had divergent relations with COVID-related behavior (see Table 9). COVID-related distress was associated with greater endorsement of survivalism and marginally with increased CDC compliance. General distress was negatively related to CDC compliance. These divergent effects of COVID-related distress and general distress mirror those found in Study 1.

Table 9

Relations Between Distress and COVID Factual Beliefs, and COVID Behaviors, Controlling for Covariates, Study 2

	Factual Beliefs								Behaviors			
	Total		Political		Medical		Fauci vs. Trump		Survivalism		CDC Compliance	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Model 1: Mood	.06**		.07***		.05*		.11***		.37***		.03*	
Model 2: Demog.	.11**		.11**		.11*		.04		.06*		.11**	
Model 3: Ideology	.13***		.19***		.08**		.43***		.13***		.15***	
Model 4: Distress	.02*		.01		.02†		.00		.03**		.08***	
COVID Distress		.28*		.22†		.28*		.02		.25**		.23†
General Stress		-.25*		-.21†		-.24*		-.05		.07		-.55***
Total R^2	.32		.31		.26		.53		.54		.38	
n	225		226		226		226		226		222	

Note. Fauci vs. Trump = Difference in trust in CDC Dr. Anthony Fauci vs. trust in then President Trump regarding the efficacy of hydroxychloroquine. Mood includes current positive mood and current negative mood; Demog. = Demographics, and includes age, gender education, cohabitation, region, and residential area. Ideology includes political party, political orientation, religiosity, and news source.
$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Resources: Bogus Beliefs — Psychosocial resources were negatively related to bogus beliefs (political, medical, and spiritual) after controlling for all covariates (see Table 10).

Table 10

Relations Between Resources and COVID Bogus Beliefs Controlling for Covariates, Study 2

	Bogus Beliefs							
	Total		Political		Medical		Spiritual	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Model 1: Mood	.49***		.48***		.43***		.47***	
Model 2: Demog.	.07**		.06**		.07**		.06**	
Model 3: Ideology	.15***		.14***		.16***		.13***	
Model 4: Resources	.03***		.03***		.03***		.02***	
		-.21***		-.20***		-.20***		-.19***
Total R^2	.73		.70		.69		.65	
n	260		260		260		260	

†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Resources: Factual Beliefs — Resources were positively related to factual beliefs, even after controlling covariates. Resources were unrelated to believing Fauci more than Trump (see Table 11).

Resources and Behavior — Resources were positively related to CDC compliance but were unrelated to survivalism (see Table 11).

Table 11

Relations Between Resources, COVID Factual Beliefs, and COVID Related Behaviors Controlling for Covariates, Study 2

	Factual Beliefs								Behaviors			
	Total		Political		Medical		Fauci vs. Trump		Survivalism		CDC Compliance	
Predictor	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	B	ΔR^2	B	ΔR^2	β
Model 1: Mood	.07***		.08***		.05**		.10***		.35***		.05***	
Model 2: Demog.	.11**		.12***		.09*		.04		.06*		.12**	
Model 3: Ideology	.11***		.15***		.07**		.32***		.13***		.12**	
Model 4: Resources	.08***		.05***		.08***		.00		.00		.14***	
		.35***		.28***		.36***		.02		-.00		.48***
Total R^2	.36		.39		.30		.56		.54		.43	
n	258		259		259		259		258		255	

Note. Fauci vs. Trump = Difference in trust in CDC Dr. Anthony Fauci vs. trust in then President Trump regarding the efficacy of hydroxychloroquine.
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Does Distress Mediate the Association Between Resources and COVID-Related Beliefs? — According to RPM, resources mitigate biased judgment by reducing the distress from which such biases arise. We tested whether this *resources → (reduced) distress → (less) bias* mediational model applies to COVID-related bogus beliefs and factual beliefs. We used Hayes's PROCESS regression script for SPSS (Hayes, 2018), in which the mediational contributions of COVID-related distress and general distress were both calculated. These dual-mediational tests included all the covariates used in the regression models and thereby controlled for mood, demographics, and ideology.

Mediation between an antecedent (X) and an outcome (Y) is verified when the mediational effect coefficient (M) is bounded by lower-level and upper-level confidence intervals that share the same sign (i.e., both are positive or both are negative), per Hayes (2018). Table 12 shows the mediation outcomes for the *resources → distress → beliefs* paths

in Study 2 using these criteria. The table distinguishes between the "Total Effect", which is the influence of resources without considering the mediational effects of distress, and the "Direct Effect" which is the influence of resources after accounting for these effects. "Resources Indirect Effects" report whether mediation was due to total distress (COVID related distress and general distress), COVID-related distress alone, or general distress alone.

Table 12

Relations Between Resources and COVID-Related Beliefs, Mediated by COVID-Related Distress and General Distress, Study 2

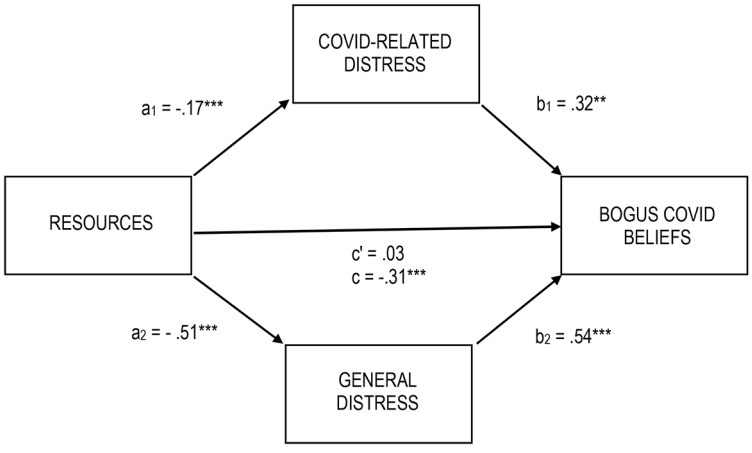
	Resources										
	Total Effect			Direct Effect				Indirect Effect			
										CI	
Outcome	*b*	*SE*	*p*	*b*	*SE*	*p*	Mediator	*b*	SE_{bt}	*LL*	*UL*	Med.
Bogus Beliefs	-.31	.05	.001	.03	.08	.74	Total Distress	-.33	.07	-.47	-.20	Yes
							COVID Distress	-.05	.03	-.11	-.01	Yes
							General Distress	-.28	.07	-.43	-.14	Yes
Factual Beliefs	.26	.05	.001	.37	.07	.001	Total Distress	-.11	.06	-.22	-.01	Yes
							COVID Distress	-.04	.02	-.08	-.00	Yes
							General Distress	-.11	.09	-.19	.04	No
Fauci / Trump Diff.	.00	.14	.98	-.10	.19	.61	Total Distress	.10	.16	-.20	.43	No
							COVID Distress	-.02	.05	-.12	.07	No
							General Distress	.12	.18	-.22	.49	No

Note. SE_{bt} = Bootstrap Standard Error. Med. = Was mediation confirmed? Fauci / Trump Diff. = Degree believe Dr. Fauci more than President Trump re. hydroxychloroquine. Mediation based on 10,000 bootstrap samples.

Resources, Distress, and Bogus Beliefs — Distress mediated the relations between resources and bogus beliefs. Both types of distress were mediators, but general distress was especially so (see Table 12 and Figure 2). Two tests of "reverse mediation", from COVID distress to bogus beliefs via resources and from general distress to bogus beliefs via resources, showed no mediation, indicating that the *resources ⟶ distress ⟶ bogus beliefs* path is unique.

Figure 2

The Effect of Resources on Bogus COVID Beliefs, Mediated by COVID-Based Distress and General Distress, Study 2



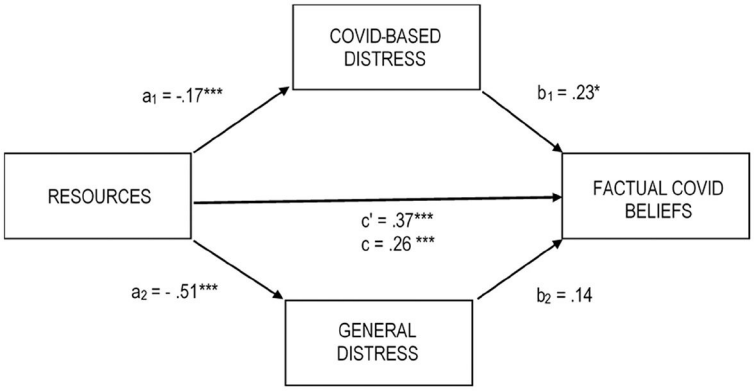
Note. c' = Direct effect; c = Indirect (mediated) effect.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Resources, Distress, and Factual Beliefs — The mediational path from resources to distress (COVID related and general) to factual beliefs differed from our expectations. It indicated that the negative relation between resources and COVID distress depressed rather than augmented factual beliefs (see Table 12 and Figure 3). However, the mediational contribu-

tion of distress was slight, and did not diminish the direct, positive connection between resources and factual beliefs. Distress did not mediate trusting Fauci more than Trump regarding hydroxychloroquine.

Figure 3

The Effect of Resources on Factual COVID Beliefs, Mediated by COVID-Based Distress and General Distress, Study 2



Note. c' = Direct effect; c = Indirect (mediated) effect.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Discussion

Study 2 reconfirmed the Study 1 associations between COVID-related distress and general distress on COVID-related bogus beliefs, factual beliefs, and behaviors. It also showed that psychosocial resources are negatively related to bogus beliefs, and that resources are positively related to factual beliefs and CDC compliance. The negative association between resources and bogus beliefs was itself mediated by distress (both COVID-related distress and general distress). Unexpectedly, distress slightly depressed the positive association between resources and factual beliefs.

General Discussion

In late summer, 2021, when COVID-19 cases resurged in the United States, vaccination rates sharply declined (Lopez, June 2, 2021). This was not due to a shortage of vaccines or facilities. It was because of beliefs that the vaccines were unsafe or unnecessary, or that they were tainted by cynical motives or sinister designs (Frankovic, May 2021). What made this wall of bogus beliefs and denialism so impenetrable, and how could it be breached? We employed the Resources and Perception Model (RPM: Harber et al., 2011) to answer these questions. According to RPM, resources lead to more accurate perceptions and judgments of disturbing things by reducing the distress that disturbing things arouse. Because bogus beliefs and denialism regarding COVID-19 can be defensive responses to threats, they, too, should be explained by RPM. Our research largely supports these predictions.

Relations Between Distress Types and COVID-Related Beliefs and Behaviors

Distress and Bogus Beliefs

People with more distress, COVID related or general, were more likely to endorse bogus beliefs. The bivariate correlations between both forms of distress and total bogus COVID beliefs exceeded $r = .70$ in both studies, suggesting that bogus beliefs could be a marker of psychological distress. The associations between distress and bogus beliefs remained significant and of moderate effect size (βs > .20) in multiple regressions that controlled for mood, demographics, and ideology, and therefore appear reliable. These results accord with related research showing that conspiracy beliefs arise

from anxiety, uncertainty, powerlessness, and other demoralizing states (Andrade, 2020; Douglas et al., 2017; Haltinner & Sarathchandra, 2018).

Interestingly, the three classes of bogus beliefs—social-political, medical, and spiritual—were highly intercorrelated, with *r*s averaging .94. Thus, people who believed that COVID-19 is a hoax designed to manipulate the stock market were also likely to believe that COVID can be cured by essential oils and were also likely to believe that COVID foretells the End of Days. There is no logical connection between these beliefs. However, there may be a psychological one, in that they all might offer people seemingly concrete, specific, and meaningful causes for the illness, and seemingly agentic responses to it. Thus, these disparate bogus beliefs could collectively provide an illusory sense of control (Andrade, 2020).[24]

Distress and Factual Beliefs

As predicted, general distress was related to denial of COVID-related facts. Unexpectedly, COVID-related distress was related to acceptance of facts. We speculate that COVID-related distress and general distress aroused different epistemic needs. General distress arises from feeling unworthy, inept, purposeless, and isolated. People experiencing such saturating dejection may need beliefs that provide clear and tractable explanations, thereby boosting subjective control (e.g., Kay et al., 2009). Factual beliefs might frustrate those needs, by presenting COVID as an invisible but formidable threat of uncertain origin and indeterminate duration. Accepting COVID-facts might also threaten partisan alliances and thus jeopardize needed social connections (e.g., Mancosu & Vegetti, 2021). COVID-related distress, in contrast, may have produced a "coping-opportunism" in which people sought any means to address the pandemic. Bogus beliefs would be psychologically useful by providing satisfying explanations and social alliances. Factual beliefs would provide validated ways to combat the illness. This coping opportunism might also explain why COVID-related distress was associated with survivalism but also with CDC compliance, as both strategies provided agentic responses to COVID.

Resources and COVID Beliefs

Study 2 showed that bogus beliefs were weaker, and factual beliefs stronger, among people with more resources (e.g., self-worth, purpose, social support). This may be the first demonstration that psychosocial resources advance accurate appraisal of collective disasters. Study 2 also underscores the social relevance of RPM. According to RPM, resources enhance judgment by reducing the distress that distorts judgment. We therefore expected that distress, COVID-related and general, would mediate the relations between resources and bogus beliefs, and between resources and factual beliefs. This expected mediation was confirmed, but only for bogus beliefs. Alternative paths, wherein distress types were the predictors and resources was the mediator, were not supported, indicating that the *resources→ distress→ bogus beliefs* path is the most informative. COVID-related distress also mediated the association between resources and factual beliefs but did so by reducing rather than increasing acceptance of COVID facts. This unexpected mediation was slight, and did not diminish the direct, positive association between resources and factual beliefs.

Fauci-Trump Index

The "Fauci – Trump" metric gauged confidence in medical advice delivered by a medical expert (then CDC director Anthony Fauci) versus an ideological leader (then President Donald Trump). Both studies showed that, per RPM, Fauci garnered more credence relative to Trump when distress was low and when resources were high. However, the Fauci – Trump metric might not only reflect epistemic orientation, but also partisan loyalties or differential preferences for Fauci and Trump as persons. Indeed, the associations between the Fauci-Trump index and distress and resources became either very weak or non-significant after controlling for ideology.

24) The two subclasses of factual beliefs, socio-political and medical, were also highly intercorrelated.

Distress, Resources, and COVID-Related Behaviors

People who follow CDC guidelines are less likely to contract the illness. Whole communities that do so can contain the pandemic. This research indicates that these desired outcomes were impeded by distress but were promoted by psychosocial resources. People with more general distress (but not COVID distress) were less likely to comply with CDC guidelines; people with any kind of distress were more inclined toward a parochial survivalism. However, people with greater resources were more likely to embrace CDC guidelines and were less attracted to survivalism. Reducing distress and boosting resources may therefore have epidemiological and societal benefits.

Contrary to predictions, COVID distress was positively related to CDC compliance after controlling for the multiple covariates. As discussed, COVID-distress might motivate a "coping opportunism" wherein all potential solutions are appealing (e.g., survivalist strategies and CDC compliance). General distress, in contrast, might motivate more emotion-focused coping (Folkman & Lazarus, 1980), where the primary goal is to escape feelings of vulnerability, isolation, and confusion by adopting simplifying and comforting ideas.

Recommendations for Future Research and Social Policy

Exploring Distress Types

Understanding why crisis-specific distress and general distress had different cognitive and coping outcomes may merit further investigation. Future research might also explore whether certain types of disasters are more likely to disrupt beliefs. Perhaps bad events with relatively clear causes, such as earthquakes, generate fewer bogus beliefs than do more ambiguous events, such as the mysterious emergence of a deadly disease.

Clarifying Causation

Longitudinal designs, initiated early in crises, could better establish the casual roles that distress and resources have on bogus beliefs and factual beliefs. Funding agencies might increase support and streamline procedures to promote such research. Future studies might explore whether bogus beliefs and denialism are risk factors for down-stream dysfunction.

Tracing the Spread of Bogus Information

Emotionally charged information often involves human transmitters (Harber & Cohen, 2005). What populations, under what conditions, are most likely to spread bogus information? What veracity thresholds do people impose, as a function of their world views, as well as their distress and their resources, before spreading bogus information?

Mental Health Awareness and Resources

People often cope better when they freely express their thoughts and feelings about travails (Harber & Pennebaker, 1992). Disclosure also reduces negative attitudes towards others (Harber et al., 2015; Harber & Wenberg, 2005), which is especially relevant to conspiracy beliefs and the search for scapegoats that disasters can produce. Thus, government agencies might consider instituting more, and more prolonged, mental health resources following disasters. Mental health practitioners might consider bogus beliefs and denialism as potential risk indicators.

Weighing the Value of Purposeful Activity

Protracted stay-at-home mandates may have deprived many people of their sources of support and of purpose, which in turn may have made them more vulnerable to bogus beliefs and less accepting of valid information. Clearly, balancing virus abatement with quality of life is not a simple task. However, the individual and societal costs of prolonged isolation may merit more consideration when addressing future pandemics.

Caveats

Causation

Our data are correlational and may reflect explanations other than those we propose. For example, distress might be the consequence rather than the cause of distorted beliefs and denialism. Thus, believing that the pandemic was engineered by sinister forces might make the world appear less benign and trustworthy, depress external efficacy (faith in the competence of external forces), and thereby increase stress (see Bernardi et al., 2023). However, in separate longitudinal research we found evidence that resources, induced by emotional disclosure, had a causal and corrective effect on COVID beliefs (Vila & Harber, 2023).

Sample Representativeness

We recruited MTurk participants, who are more demographically representative than college samples but also younger and better educated than the general population (Aguinis et al, 2021). Also, our sample trended toward political liberalism. However, differences between MTurk samples and the general population can be mitigated by controlling for the demographic attributes we covaried and by employing the attention checks we used (Aguinis et al., 2021; Levay et al., 2016).

Mediation

Mediational tests on cross-sectional data are subject to various confounds (Fiedler et al., 2018). Nonetheless, there are reasons to regard our mediational outcomes as reliable. They were guided by RPM, and thus satisfy the condition that mediation be theoretically informed (Fiedler et al., 2018). Further, our model out-performed alternative models, in which distress was the predictor and resources was the mediator.

Conclusion

According to historian Yuval Harari, humanity's defining adaptation is the ability to construct meaningful narratives, which link people and ideas across distances and over generations (Harari, 2015). However, stabilizing social narratives can be undermined by major upheavals such as the COVID-19 pandemic. When this happens "Man's Search for Meaning" (cf., Frankl, 1985), can become a mad scramble, where simplifying, empowering, but false beliefs are clutched, while complex, evolving, and sometimes disturbing facts are rejected.

The present research confirms these tendencies. People with greater distress were more drawn to COVID-19 bogus beliefs. Those with personal distress (but not COVID-related distress) were more prone to reject valid information. It may be tempting to regard such people as in some way deficient or in need of more information more ardently conveyed. Yet the present research showed that distress was associated with bogus beliefs even after controlling for demographics, ideology, and other attributes. And in any case, being told, "you are wrong" does not often shift viewpoints.

Our findings indicate that lack of resources, rather than compromised dispositions, determined COVID-19 beliefs. People with more hope, optimism, self-esteem, social support, and purpose were less susceptive to bogus beliefs and more accepting of valid information. Resources may have had these epistemic benefits by reducing the distress that can make bogus beliefs appealing. The negative relations between resources and bogus beliefs, and between resources and factual denialism suggest ways to address the epistemic fallout that disasters create: Provide people with a unifying purpose, protect their self-worth, and offer them a non-partisan sense of belonging.

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Ethics Statement: Research was conducted in accordance with APA ethical standards with Rutgers University IRB approval.

Data Availability: All data collected for this research is available on the Open Science Framework (OSF) under the project name "COVID Beliefs" (Harber & Vila, 2023a).

Supplementary Materials

The Supplementary Materials contain the following items (for access see Index of Supplementary Materials below):

- The research data for the Pilot Study, Study 1, and Study 2
- Additional information:
  - Supplemental Tables
  - Supplemental Research Materials
  - Supplemental Text: Pilot Study Summary

Index of Supplementary Materials

Harber, K. D., & Vila, V. M. (2023a). *COVID Beliefs* [Research data]. OSF. https://osf.io/tmgp7/

Harber, K. D., & Vila, V. M. (2023b). *Supplementary materials to "Fevered reasoning: How heightened distress and lowered resources relate to COVID-19 beliefs"* [Additional information]. PsychOpen GOLD. https://doi.org/10.23668/psycharchives.12864

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Appendix

Table A1

Summary of Principal Variables

Domain	Composite / Tested Variables	Component Variables
Beliefs	Bogus Beliefs	Sociopolitical
		Medical
		Spiritual
	Factual Beliefs	Sociopolitical
		Medical
	Fauci-Trump	Endorse Fauci opinion
		Endorse Trump opinion
Behaviors	CDC Compliance	
	Survivalism	
Distress	COVID Distress	COVID Negative Mood
		COVID Vulnerability
		COVID Life Disruptions
	General Distress	General Life Stress
		General Health Symptoms
		Anxiety[a]
		Depression[a]
		Fear of Hope[a]
Resources	Resources	Hope[a]
		Optimism[a]
		Purpose[a]
		Self-Esteem[a]
Covariates	Current Mood	
	Demographics	
	Trust Liberal News	
	Trust Neutral News	
	Trust Conservative News	

Note. [a]Study 2 only. Demographics includes the separate contributions of age, gender, ethnicity, region, religiosity, political orientation. Demographics is not a composite variable.