

Behavioral extremity moderates the association between certainty in attitudes about COVID and willingness to engage in mitigation-related behaviors

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Abstract

People generally intend to act more on beliefs and attitudes about which they have greater certainty. However, we introduce a boundary condition to the positive association between certainty and behavioral intentions—behavioral extremity. Uncertainty about a threatening issue like COVID-19 can be disconcerting, and we propose that uncertain people cope in part through increased openness to extreme actions like accepting risky medical treatments and aggression toward those defying mitigation policies. Testing this, we compiled and analyzed all the data on certainty about COVID-19 mitigation policies and willingness to engage in mitigation-related behaviors that our lab collected during the pandemic (6 samples, 20 behaviors, *N*s up to 1496). External ratings of the behaviors' extremity moderated certainty-willingness associations: whereas greater certainty was associated with increased willingness to engage in moderate behaviors (the typical result), *lower* certainty was associated with increased willingness to engage in extreme behaviors, especially among those worried about becoming ill.

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KEYWORDS

attitude–behavior consistency, attitude certainty, compliance, COVID-19, extremism, perceived threat, public health

1 | INTRODUCTION

People generally have greater intentions to act on their more confidently held beliefs and attitudes (Bizer et al., 2011; Philipp-Muller et al., 2020; Visser et al., 2003). Examining support for and compliance with policies aimed at mitigating viral spread during the COVID-19 pandemic, we test a novel boundary condition of this well-known positive association between attitude certainty and the tendency to act on one's attitudinal position—behavioral extremity. Much prior work on the attitude–behavior relationship suggests that greater certainty about one's support for COVID mitigation efforts should be associated with more willingness to engage in mitigation behaviors (Petty & Krosnick, 1995; Tormala & Rucker, 2018). However, prior research on attitude certainty has almost exclusively considered *ordinary* behaviors like buying a consumer product or wearing a mask. In the current work, we test our hypothesized reversal as a function of extremity, expecting *lower* certainty to simultaneously be associated with more willingness to engage in *extreme* mitigation behaviors like accepting risky medical treatments and hostility toward those defying mitigation policies.

Attitude confidence signals to people that their positions are valid (Rucker et al., 2014), and research shows this typically increases attitude–consistent behavior (Tormala & Rucker, 2018). For example, certainty in one's evaluations of candidates in a political election would usually make voting more likely. However, attitudes held with low confidence can be more impactful under particular conditions because doubtful people often want to feel more certain (Chen et al., 1999; DeMarree et al., 2014) and take steps to try to increase certainty (Sawicki & Wegener, 2018). Defensive motivation can thereby reverse the typical positive association between attitude certainty and the attitude's impact on judgment and behavior (Cheatham & Tormala, 2017; Gal & Rucker, 2010).

Complementing these findings from the attitudes literature, research on self-threat similarly shows that perceiving personally important beliefs as vulnerable or insecure often creates defensiveness (Kernis et al., 2008; McGregor et al., 2013). For example, having an important position challenged can produce a sense that one's views are under attack, causing people to become dogmatic and lash out at disagreeing others (Gollwitzer et al., 2022). We theorized that even in the absence of an overt challenge, it would be disconcerting simply to lack certainty when one wants to or thinks one should be certain (DeMarree et al., 2014), such as when facing a potentially threatening topic where protective actions might be necessary (Haas & Cunningham, 2014; Neta et al., 2017). Thus, in the face of physical and psychological threats from the pandemic (Kachanoff et al., 2021), uncertainty about pandemic-related issues would likely aggravate the sense of threat (Higgins, 1987; Oettingen et al., 2022) and promote efforts to increase certainty (Chen et al., 1999).

We propose that *extreme* behaviors are especially likely to be targets of defensive motivation arising from threatening uncertainty. Hence, we suggest the *extremity* of an attitude–consistent behavior shapes the relationship between attitude certainty and willingness to engage in the behavior. In accord with prior work, we define more extreme behaviors as those that increasingly deviate from the norm (e.g., Kruglanski et al., 2021). Thus, whereas wearing a mask to mitigate the effects of COVID is fairly common, attacking people who are not wearing masks is rare, and would therefore be categorized as reflecting more extreme COVID mitigation behavior. The notion of organizing attitude–relevant behaviors along an extremity dimension is a key feature of Guttman (1944) scaling, which has been used in various domains. For example, in a classic instantiation, Bogardus (1947) arranged actions related to racial acceptance along an extremity dimension (i.e., degree of social distance) so that at one end of the continuum were mundane behaviors that virtually everyone would agree to (e.g., working with a minority group member) to those that at the time had much less behavioral agreement (e.g., marrying a person of another race). Being willing to engage in moderate (ordinary) behaviors is common and does not necessarily reflect any strong attitudinal commitment (e.g., racial acceptance, COVID mitigation).

We hypothesized that although moderate behaviors would be endorsed more as attitude certainty increased, extreme behaviors would be more appealing when certainty was lower, especially if the issue was threatening. Extreme behaviors are viewed as diagnostic of a person's beliefs (Fiske, 1980; Skowronski & Carlston, 1989) and can bolster one's position on an issue by clearly signaling to oneself and others where one stands. Consistent with this, prior research shows that uncertainty about the self can increase attraction to extreme identities (Hogg, 2007) and attitude positions (McGregor, 2003), which provide self-definition that uncertain people often crave. We extend similar reasoning to uncertainty about attitudes with important implications for the self, suggesting people express openness to extreme behaviors partly to defend and secure beliefs that feel vulnerable. Thus, we anticipated a reversal of the typical effect, with lower certainty about one's attitudes regarding COVID mitigation policies (e.g., mask mandates) relating to *greater* expressed willingness to engage in extreme mitigation behaviors.

We specifically expected behavioral extremity to moderate the association between certainty in attitudes toward and willingness to engage in COVID mitigation-related behaviors because many consider the pandemic context threatening (Bartusevičius et al., 2021; Kachanoff et al., 2021). This threat would create a desire to have a clearer position on the issue. We also anticipated an interaction between certainty and threat, with the greatest willingness to engage in extreme behaviors among those low in certainty and high in COVID threat perceptions. Overall, we examined the associations between certainty and willingness to engage in mitigation-related behaviors as a function of behavioral extremity and threat.

2 | EMPIRICAL OVERVIEW AND METHOD

Inspiration for our hypotheses came from exploratory data collected before the pandemic using a non-COVID topic (abortion legality). There, we assessed attitudes and attitude certainty regarding legal abortion, and took common measures of willingness to fight or die in support of one's position on the issue (clearly extreme behaviors; Swann et al., 2009). Unexpectedly at the time, we found a negative correlation between certainty and willingness to fight and die in support of the attitude. Considering this new evidence, we then formulated our hypotheses about behavioral extremity and threat moderating the relationship between attitude certainty and attitude-consistent behavioral intentions, and identified the pandemic as a suitable context for testing them. Across six samples, we assessed participants' attitudes toward COVID-19 mitigation policies, certainty about those attitudes, perceived threat from COVID, and willingness to engage in mitigation-related behaviors varying in extremity. In total, we measured 20 behaviors, with a subset included in each sample. This allowed us to create meaningful variability across types of behaviors and assess generalizability across stimuli (Judd et al., 2012) without fatiguing participants. Lastly, to validate our assumptions and directly test the role of extremity, we recruited a new sample and measured participants' ratings of the behaviors' extremity, using these normative extremity ratings as a predictor in our analyses. We compiled the data and performed multi-level analyses with certainty, threat, and normative behavioral extremity predicting behavioral willingness while controlling for variance attributable to particular behaviors, samples, and participants. We report every dataset collected in this line of work and every attitude-consistent behavioral intention measured in these datasets. Four samples were collected on Amazon Mechanical Turk using all available filters to ensure data quality that were available on the CloudResearch platform at the time (Litman et al., 2017) and open participation was allowed otherwise. Two samples were collected from undergraduate introductory psychology students. Data and analysis code are available at https://osf.io/c74k3/?view_only=02927ba55ef140c093b398018872632b.

3 | MEASURES

We recruited six samples from April 2020 to November 2021 assessing attitudes (toward mask mandates, four samples; social distancing, one sample; generic "COVID precautions," one sample), attitude certainty (two items,

TABLE 1 Behaviors from least to most extreme.

	COVID-19 mitigation-related behavior	Extremity	Behavioral willingness	Samples and sample size
1	Washing or sanitizing one's hands to help prevent spread of COVID	1.97	$M = 6.68, SD = 0.81$	$k = 1, N = 110$
2	Following recommended COVID mitigation guidelines	2.32	$M = 6.55, SD = 0.92$	$k = 1, N = 110$
3	Supporting politicians whose COVID positions one agrees with	2.41	$M = 5.43, SD = 1.59$	$k = 2, N = 524$
4	Getting treated if sick with COVID	2.41	$M = 5.04, SD = 1.69$	$k = 2, N = 632$
5	Wearing a face mask when in public to prevent spread of COVID	2.46	$M = 6.38, SD = 1.09$	$k = 5, N = 1213$
6	Getting vaccinated against COVID	2.72	$M = 5.52, SD = 1.69$	$k = 2, N = 632$
7	Avoiding crowds to prevent spread of COVID	2.79	$M = 5.61, SD = 1.64$	$k = 6, N = 1496$
8	Advocating for one's views about COVID mitigation guidelines	3.06	$M = 4.78, SD = 1.81$	$k = 1, N = 524$
9	Trying to change opponents' minds about COVID mitigation guidelines	3.92	$M = 4.83, SD = 1.69$	$k = 2, N = 632$
10	Arguing with non-compliers with COVID mitigation guidelines	4.86	$M = 2.47, SD = 1.67$	$k = 1, N = 105$
11	Blocking non-compliers on social media	5.03	$M = 3.62, SD = 2.09$	$k = 1, N = 349$
12	Self-isolation during COVID	5.03	$M = 3.94, SD = 2.06$	$k = 4, N = 1386$
13	Accepting untested COVID treatment	5.13	$M = 4.36, SD = 1.85$	$k = 2, N = 632$
14	Participating in COVID vaccine trial	5.20	$M = 3.55, SD = 2.05$	$k = 2, N = 632$
15	Trying to get non-compliers with COVID mitigation guidelines fired	5.24	$M = 2.62, SD = 1.87$	$k = 2, N = 524$
16	Fighting non-compliers with COVID mitigation guidelines	5.70	$M = 2.58, SD = 1.83$	$k = 6, N = 1491$
17	Confronting non-compliers with COVID mitigation guidelines	5.80	$M = 3.26, SD = 1.76$	$k = 1, N = 427$
18	Sacrificing one's life to help develop COVID vaccine	6.29	$M = 2.82, SD = 2.02$	$k = 2, N = 632$
19	Sacrificing one's life to save economy from effects of COVID	6.38	$M = 2.46, SD = 2.05$	$k = 2, N = 632$
20	Committing violence against non-compliers	6.55	$M = 1.68, SD = 1.34$	$k = 5, N = 1208$

Note: Descriptive statistics for behavioral willingness, number of samples (k), and combined sample size (N) are also presented. Overall, the more extreme the behavior, the less willingness to engage in it, $r(18) = -0.93, p < 0.0001$.

$r(1611) = 0.83, p < 0.001; M = 6.04, SD = 1.09$), and perceived threat (four items, $\alpha = 0.84; M = 4.92, SD = 1.41$)—participants' concerns that they or someone they care about could become seriously ill from COVID (similar to realistic COVID threats in Kachanoff et al., 2021).¹ Finally, we measured willingness to engage in 20 attitude-consistent behaviors (see Table 1). Some behavioral willingness measures we included are based closely on prior research on extremism (Gollwitzer et al., 2022; Swann et al., 2009) and compliance with COVID mitigation policies (Gadarian et al., 2021; Kachanoff et al., 2021). Because of their similarity to established measures, we assessed some of these in most or all samples. Others were selected on an ad hoc basis with the goal of further testing generalizability across stimuli. For these, we selected behaviors that (a) seemed relevant to and plausible in the context (COVID-19), (b) were applicable when we asked them (e.g., we stopped asking about participating in a COVID vaccine trial once the vaccine was released), and (c) could meaningfully impact individual and/or collective wellbeing. We tried to come up with a mix of behaviors varying in how moderate versus extreme they are. We then recruited a separate sample to rate how extreme performing each behavior would be ($69 < n < 72$, depending on behavior) and, in our main analyses, assigned each behavior the mean extremity rating from this sample. Certainty, threat, behavioral willingness, and behavioral extremity were assessed using seven-point scales (1 = Not at all, 7 = Very much). We expected the extremity ratings to moderate the relationship between certainty and willingness, with more negative (positive) associations at higher (lower) extremity. We also expected a stronger negative effect at high extremity when threat was also high.

Our theorizing applies more straightforwardly to behaviors consistent with (vs. contradicting) one's position because only attitude-consistent (vs. inconsistent) behaviors would bolster one's position. Uncertainty about self-relevant issues leads people to seek clarity through alignment with extreme positions (Hogg, 2007; McGregor, 2003). We similarly expected uncertainty about an attitude with important implications for the self to lead people to seek clarity through alignment with extreme behavior. Extreme attitude-consistent behaviors send strong, diagnostic signals about one's position, which people experiencing doubts about a threatening issue find appealing. However, attitude-inconsistent behaviors likely would not help in this regard. Also, as a practical matter, few participants opposed COVID mitigation policies (4.7%–14.8%, 11.0% across samples). We therefore adapted our analytic approach to this aspect of our theorizing, excluding participants for whom policies aimed at mitigating COVID were attitude-inconsistent (although we report analyses of those participants in the Supporting Information S1). This left 1496 participants ($M_{\text{age}} = 28.72$, $SD = 13.26$; female = 714) for the behavior with the most observations (avoiding crowds). Descriptive statistics and sample sizes for the behavioral willingness measures are presented in Table 1. The measures are detailed in the Supporting Information S1.

4 | RESULTS

We meta-analyzed the combined data using a multi-level model. This technique models individual participant data from all samples while accounting for variance associated with the different samples rather than solely considering summary statistics from each sample (Raudenbush & Bryk, 2002). Because we include every data point collected in this line of research, this provides unbiased effect size estimates, consistent with recommended best practices (Fabrigar & Wegener, 2016; Goh et al., 2016; McShane & Böckenholt, 2017).

We specified a model predicting behavioral willingness, with three levels: willingness ratings (level 1) were nested within samples (level 2), which were nested within type of behavior (level 3). (Essentially the same results emerged when willingness ratings were nested within a binary MTurk/undergraduate population variable, so we focus on analyses with individual samples.) We entered behavioral extremity (grand-mean centered) at level 3, with each type of behavior assigned its mean normative extremity rating from the external sample, and entered certainty and perceived threat (group-mean centered within behavior type) at level 2, along with the two- and three-way interactions. We specified random slopes and intercepts for all predictors. The interaction between certainty and behavioral extremity, shown in Figure 1, was significant, $b = -0.18$, $t(14.11) = -5.39$, $p < 0.0001$, 95% CI: [-0.2508, -0.1082]. As expected, certainty positively predicted willingness to engage in low extremity behaviors (-1 SD extremity), $b = 0.32$, $t(14.70) = 4.23$, $p = 0.0008$, 95% CI: [0.1562, 0.4745], but this reversed for high extremity behaviors (+1 SD extremity), $b = -0.23$, $t(15.42) = -3.40$, $p = 0.004$, 95% CI: [-0.3747, -0.0864].

The reversal was particularly evident for willingness to participate in an experimental COVID vaccine trial ($r(630) = -0.14$, [-0.22, -0.07]), and to sacrifice one's life to help develop a vaccine ($r(630) = -0.24$, [-0.31, -0.17]) or to save the economy ($r(630) = -0.33$, [-0.40, -0.26]), $ps < 0.0004$ —a point we return to in the general discussion. We next examined moderation by perceived threat. Uncertainty about COVID mitigation efforts would likely be especially disconcerting for those most worried about the illness. Thus, we expected the strongest negative correlation between certainty and extreme behavior for those with higher concerns about the illness. We anticipated a two-way interaction between certainty and threat when behavioral extremity was high, with a stronger negative relationship as threat increased. We did not make a prediction regarding threat at low extremity but still examined the full range of extremity for completeness.

The results are shown in Figure 2. The three-way interaction was not significant, $b = -0.01$, $t(3558) = -1.84$, $p = 0.066$, 95% CI: [-0.0230, 0.0007]. Rather, the two-way certainty \times threat interaction was significant both at high behavioral extremity, $b = -0.07$, $t(4040.49) = -5.30$, $p < 0.0001$, 95% CI: [-0.0910, -0.0419], and low extremity, $b = -0.03$, $t(1709.77) = -2.27$, $p = 0.023$, 95% CI: [-0.0597, -0.0043]. For extreme behaviors, certainty did not have a significant effect when threat was relatively low (-1 SD, or 3.51/7—low-to-medium in absolute terms), $b = -0.14$, $t(14.10) = -2.02$, $p = 0.063$, 95% CI: [-0.2970, 0.0090], but had a significant negative effect when threat was high

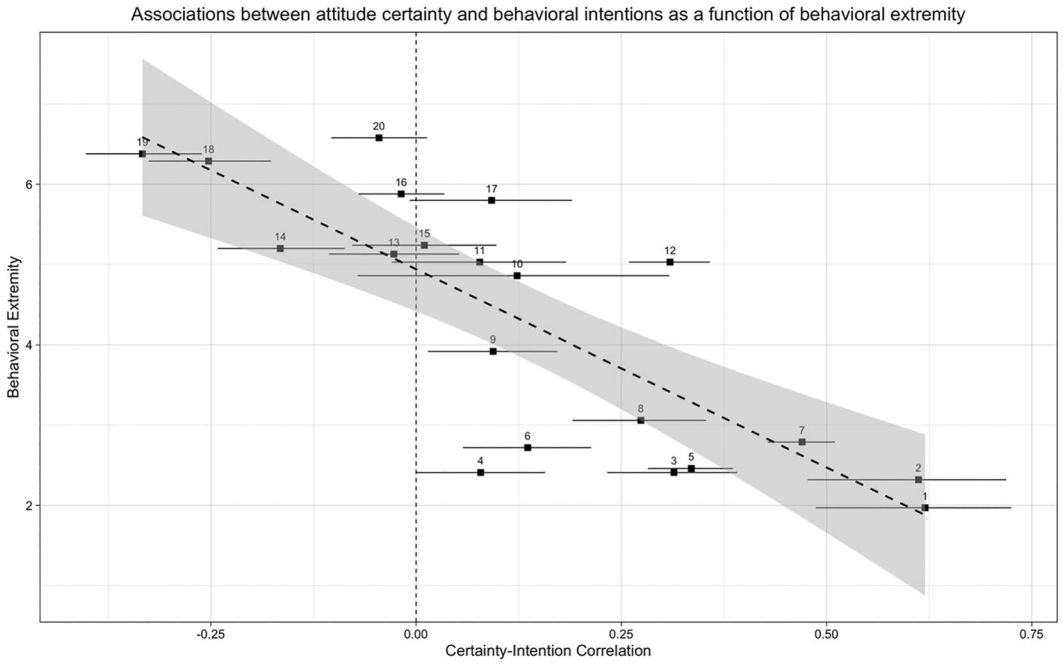


FIGURE 1 Attitude certainty predicting behavioral willingness as a function of behavioral extremity (with a line of best fit). Numbers correspond to rank order extremity (see Table 1). Error bars are 95% CIs.

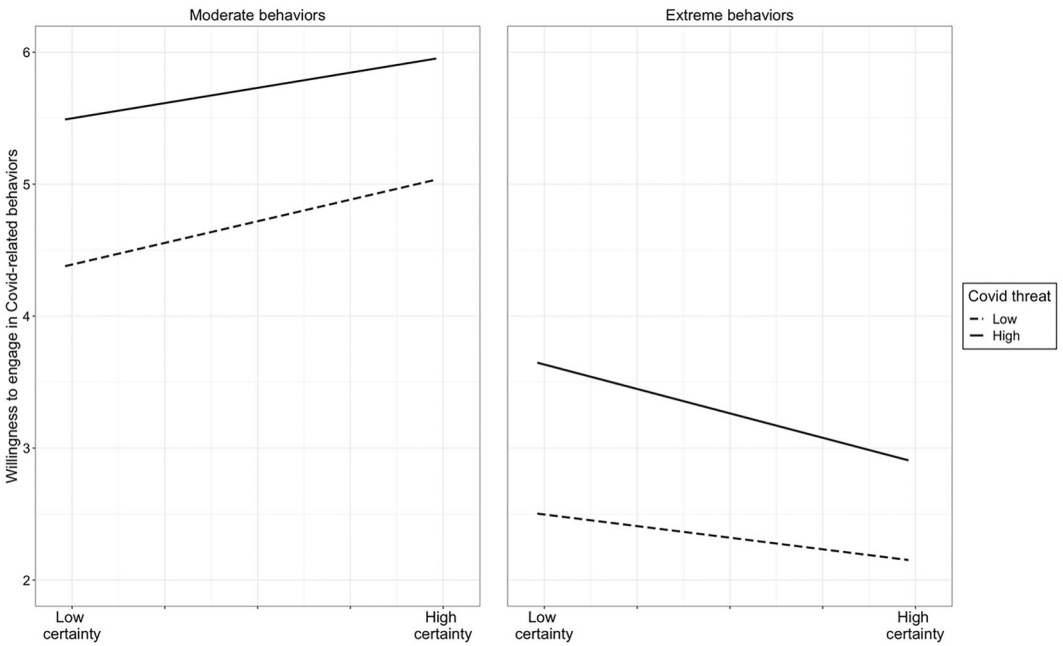


FIGURE 2 Behavioral willingness as a function of COVID attitude certainty, perceived COVID threat, and the extremity of the COVID-related behavior. Values of certainty, threat, and behavioral extremity are plotted at ± 1 SD.

(+1 SD, or 6.33/7), $b = -0.33$, $t(16.49) = -4.47$, $p = 0.0004$, 95% CI: $[-0.4876, -0.1743]$. For moderate behaviors, the certainty slopes were significantly positive both when threat was high, $b = 0.28$, $t(19.67) = 3.54$, $p = 0.002$, 95% CI: $[0.1131, 0.4391]$, and relatively low, $b = 0.37$, $t(17.14) = 4.81$, $p = 0.0002$, 95% CI: $[0.2052, 0.5253]$. These simple effects indicate that greater certainty predicted more willingness for moderate behaviors across levels of threat, but lower certainty predicted more willingness for extreme behaviors mainly when threat was high.

Separate multiple regression analyses revealed that the certainty \times threat interactions were significant for willingness to engage in a number of individual extreme behaviors: participating in an experimental vaccine trial ($b = -0.24$, $t(628) = -3.30$, $p = 0.001$), sacrificing one's life for the vaccine ($b = -0.30$, $t(628) = -4.34$, $p < 0.0001$) or the economy ($b = -0.40$, $t(628) = -5.82$, $p < 0.0001$), and confronting ($b = -0.18$, $t(423) = -4.10$, $p = 0.0001$) and fighting non-compliers ($b = -0.07$, $t(1485) = -2.34$, $p = 0.020$). Meanwhile, as implied by the results of the multi-level analysis, which accounts for variability across the different behavioral willingness measures (Judd et al., 2012), even extreme behaviors not significantly predicted by the certainty \times threat interaction conformed to the same directional pattern.

Finally, we repeated our analyses controlling statistically for political orientation (detailed in the Supporting Information S1) and found the results were essentially unchanged: Both the certainty \times behavioral extremity interaction and the certainty \times threat interaction (overall and specifically for extreme behavior) were robust. Political orientation also did not moderate these results.

5 | GENERAL DISCUSSION

The present research investigated the relationship between attitude certainty and willingness to engage in attitude-consistent behaviors in the context of COVID-19 mitigation policies. Although it is generally accepted and supported by research that individuals tend to act more on beliefs and attitudes about which they have greater certainty, we showed that this relationship does not always hold. Instead, we predicted and found that being more *uncertain* about COVID-19 mitigation policies was associated with a greater willingness to engage in extreme mitigation-related behaviors. Thus, we introduce *behavioral extremity* as a novel moderator of the relationship between attitude certainty and the tendency to act on one's attitudinal position. Additionally, the negative associations between certainty and extreme behaviors were strongest when the topic was highly threatening, consistent with the notion that the relationship reflects defensive motivation producing efforts among those with doubts to bolster their position.

We also found that the negative effects of certainty were most pronounced for extreme behaviors that could be considered instrumental to the goal of mitigating COVID (e.g., participating in an experimental COVID vaccine trial). This could reflect a *compatibility* effect (Ajzen & Fishbein, 1970) in which the attitudes we assessed about mitigation were more effective in predicting specific mitigation intentions rather than more general COVID-relevant intentions (cf. Weigel & Newman, 1976). However, lower attitude certainty was related to even more general COVID-relevant behaviors (e.g., confronting people who defy mitigation policies) when threat from COVID was high, suggesting broader applicability.

The current findings tie together literature on attitude certainty (Tormala & Rucker, 2018) and behavioral extremism (Kruglanski et al., 2021) and have the potential to advance both fields. Regarding certainty, our results join a small but growing body of work showing that doubtful (vs. confident) attitudes sometimes have more impact (e.g., Clarkson et al., 2017; Sawicki & Wegener, 2018). However, we know of no prior instance of this extending to extreme behavioral intentions. Regarding extremism, our findings align with perspectives which posit that people go to extremes to manage uncertainty (McGregor et al., 2013) and to defend attitudes they perceive as vulnerable (Oettingen et al., 2022), whether due to being challenged by others (Gollwitzer et al., 2022) or, as here, because they seem too weak to meet the demands of a threatening situation. Thus, the present results also contribute to research on psychological compensation for self-threats (e.g., McGregor et al., 2013), suggesting extreme actions like risky and aggressive behavior might serve a defensive function in relation to threats like the pandemic (Bartusevičius et al., 2021).

We note four limitations of our findings. First, we did not assess actual behavior in these studies, but rather self-reported *willingness* to engage in particular behaviors. Of course, claiming willingness to do something does not mean one would actually do it, especially if it is extreme (McCauley & Moskaleiko, 2017). There is no feasible way to measure

some actual behaviors represented here, however. Moreover, self-reported behavioral intentions are considered the single best psychological predictor of a person's likely actual behavior (Fishbein & Ajzen, 1975; Morwitz & Munz, 2020; Webb & Sheeran, 2006) and using self-reports allowed us to examine a diverse set of stimuli and test the effects of extremity with adequate statistical power. Notably, limitations of self-reports apply to both moderate and extreme intentions and we replicated the traditional effect with moderate behaviors while reversing it with extreme behaviors.

Second, although we offered a causal interpretation—people want to feel certain about threatening issues, making extreme behaviors appealing as means of bolstering their position—our data are correlational and alternative explanations cannot be excluded. For example, perhaps the reversal occurs because extreme behaviors worsen the threat that uncertain people feel. Another possibility is that doubtful people view normatively extreme behaviors as less extreme than more confident people do (although this would not explain why threat moderated the effect). Relatedly, determining which specific attributes associated with extremity are the “active ingredients” driving the reversal is an important direction for continued research. Some possibilities include the extent to which behaviors are (a) common/uncommon, (b) socially desirable/undesirable, (c) diagnostic of commitment to one's position, (d) useful or effective, (e) harmful, and (f) uncomfortable or threatening to do. Still, our findings complement existing work on attitude certainty, most of which is also correlational (e.g., DeMarree et al., 2020; Philipp-Muller et al., 2020), as well as work on extremity in motivation (McGregor et al., 2013) and social perception (Skowronski & Carlston, 1989).

Third, we exclusively studied people who were at least directionally pro-mitigation due to their predominance in our samples, so generalizability to anti-mitigation behaviors and individuals remains an open question. It is unclear how serious this limitation is, however. Prior literature would seem to predict *stronger* effects on the anti-mitigation side, given that conservatism (vs. liberalism) is often associated with less tolerance of uncertainty (Costello et al., 2022) and opposition to mitigation policies was associated in the U.S. with conservatism (Gadarian et al., 2021). Fourth and finally, because we recruited online and student convenience samples in the U.S., we cannot determine how broadly our results generalize beyond these populations.

Policies aimed at limiting the spread of COVID-19 imposed considerable demands on individuals' behavior. Although many complied with mitigation policies and made moderate sacrifices to protect their own and others' health like wearing a mask, these were far from the only behaviors to manifest, and some engaged in various more *extreme* and often riskier or more confrontational actions (e.g., Hunter, 2022). In considering this full spectrum of COVID mitigation-related behaviors, while bearing in mind the limitations of self-report measures, the present work helps to characterize the dynamics of social behavior during a pandemic.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in Open Science Foundation at https://osf.io/c74k3/?view_only=02927ba55ef140c093b398018872632b.

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ENDNOTE

¹ One of the six samples was mentioned in a recent chapter (Siev et al., 2022) but the present analyses including five additional samples are new.

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