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## Persuasive Messages, Social Norms, and Reactance: A Study of Masking Behavior during a COVID-19 Campus Health Campaign

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### ABSTRACT

Efforts by universities to reduce the spread of COVID-19 include health campaigns intended to encourage students to wear masks. While well-intended, these efforts may produce counter-persuasion (e.g., decrease masking) if they are seen as threatening individuals' freedom to choose. In a rolling cross-sectional study of one university campaign ( $n = 681$ ), we found that the presence of the campaign did instigate a form of resistance known as reactance and that reactance was negatively associated with masking behavior. Masking was also diminished by the frequency with which respondents observed others not wearing a mask (anti-masking descriptive norm) and the frequency with which respondents observed others expressing disdain for masking (anti-masking injunctive norm). Most of these findings were magnified among students who identified as politically conservative. There was no evidence that the frequency of seeing others speak in favor of masks (pro-masking injunctive norm) produced an increase in masking. The results provide valuable theoretical insights into the causes of reactance and empirical evidence of the risks associated with student-oriented COVID safety campaigns.

As of this writing, COVID-19 is responsible for almost 5 million deaths worldwide (Johns Hopkins University of Medicine, *n.d.*). Efforts to slow the spread of the virus and to protect individuals' health take many forms, but one that is universally recommended by credible health experts is the use of a face mask (Rahimi & Abadi, 2020). Accordingly, universities across the U.S. mounted health campaigns to encourage masking, and other COVID-related safety behaviors, among their students, faculty, and staff. Underlying these efforts was the belief that assembling students for in-person instruction would result in heightened infection rates on campuses and in local communities (Leidner et al., 2021).

The campus health campaigns were, of course, influenced by off-campus factors. Politicization of masking began as early as March of 2020. While health officials encouraged masking as a benefit to public well-being, President Trump disdained the behavior as weak (Walker, 2020) and as an unjustified constraint on personal freedom (Chappell, 2020). These conditions presented an opportunity to study the interplay of interesting theoretical processes during a multifaceted and consequential real-world event.

We focused on a single campaign whose theme was *Mask Up or Pack Up (MUPU)*, a phrase that promised students they would be sent home if they failed to comply with safety protocols. It is well established that such aggressive locutions can produce counter-persuasion in at least some segments of the target audience (Reynolds-Tylus, 2019; Rosenberg & Siegel, 2018 for reviews). The primary motivation for the project was to assess the degree to which this danger was realized. To gain insights into the effect of contextual factors and variation

among audience segments, we examined the effects of political ideology and social norms. Next, we offer a brief review of reactance theory, the framework on which the inquiry was designed.

### Reactance theory

Reactance theory possesses four major components (Brehm, 1966). *Freedoms* are beliefs about the ways in which one can behave, evaluate, or feel. Anything that interferes with an individual's autonomy may be perceived as a *threat to freedom*. Attempts at persuasion can be viewed as threats because they direct individuals to change the way that they act, think, or feel. *Reactance* is "the motivational state that is hypothesized to occur when a freedom is eliminated or threatened" (Brehm & Brehm, 1981, p. 37). Experienced as the combination of anger and critical cognitions (Dillard & Shen, 2005), reactance is the key mediator and central explanatory mechanism of the theory. The fourth component is *restoration*. Individuals who experience reactance become motivated to reestablish their perceived freedom. Although the theory specifies several means for achieving this goal, the preferred method is direct restoration, that is, doing the behavior that has been threatened. The theory can be represented as a two-step sequence (threat  $\rightarrow$  reactance  $\rightarrow$  restoration), one that has been empirically validated in many studies (e.g., Quick & Stephenson, 2007; Rains, 2013). Following the logic of reactance theory, we anticipated that the MUPU campaign had the potential to be perceived as a threat to one's freedom to mask or not, to stimulate reactance, and to reduce masking behavior.

**H1:** Perceived threat to freedom is positively associated with reactance (a combination of anger and critical cognitions).

**H2:** Reactance is negatively associated with the prescribed behavior (i.e., masking).

### **Activation and mitigation of reactance**

Because we were also interested in factors that might shape reactance to the *MUPU* campaign, we considered the political ideology of respondents as well different types of social norms. We expected that a focus on these concepts would provide novel theoretical insights as well as useful information pertaining to audience segmentation.

#### **Political ideology**

The concept of freedom as espoused by Brehm (1966) is not radically different from ideas developed by political theorists, who have described it as the absence of either oppression (Young, 1990) or coercion (Sandel, 2010). At this point in history, the concept of personal freedom is most closely associated with individuals who identify as conservatives. This is readily seen in the rhetoric of the Republican party and in right-leaning news media, all of which make personal freedom a recurrent theme (Lupton et al., 2017). Given that the idea is so deeply embedded in contemporary conservative discourse, political ideology can be seen as a proxy for the desire for autonomy, albeit one that is freighted with additional social meaning. Prior research shows evidence of reactance-like effects among conservatives. Right-leaning (vs. left-leaning) individuals are more likely to reject regulatory messages from the government that concern cell phone use, unhealthy foods, and e-cigarettes (Irmak et al., 2020). Similarly, Zhou (2016) found that Republicans, more so than Democrats, resisted messages that encouraged support for governmental action against climate change. This same phenomenon is likely to be true for masking, which became highly politicized prior to our study and was often discussed as a matter of personal freedom (Aratani, 2020). We predicted that:

**H3:** Conservative political ideology is positively associated with perceptions of the *MUPU* campaign as a threat to freedom.

#### **Campaign exposure**

Even a single persuasive message has the potential to arouse reactance. However, given an interest in the efficacy of a safety campaign as a means of minimizing risky behavior, we focused on cumulative exposure to all campaign messages. The theme of the campaign, which appeared on every message, was *Mask Up or Pack Up*. This is unequivocally a threat in the lay use of that term; that is, the promise of an undesirable consequence delivered by the message source resulting from the target's failure to comply. In reactance theory terms, we believed that the campaign theme was likely to be perceived as a threat to freedom as well (Brehm, 1966). *MUPU* also explicitly reveals the persuasive intent of the source, which previous research has shown to produce reactance (Brehm & Brehm, 1981). For all of

these reasons, we expected that more frequent exposure to *MUPU* campaign messages would lead to higher levels of reactance to the campaign.

Although reactance theory is often seen as a theory of resistance to persuasion, in reality, it supposes that any persuasive effort has the potential to engender reactions that are consistent *and* inconsistent with the advocacy of the message. Reactance typically works against persuasion, but the overall impact of any message is determined by the mix of pro and con reactions to it. Prior work shows that repeated exposure to campaign messages can enhance persuasion (e.g., McAfee et al., 2017), by increasing comprehension and familiarity and by creating the impression that the claim is true (Reinhard et al., 2014). On this basis, we anticipated that frequency of exposure could also produce campaign-consistent effects and offered complementary hypotheses:

**H4:** Frequency of campaign exposure is positively associated with perceptions of the *MUPU* campaign as a threat to freedom.

**H5:** Frequency of campaign exposure is positively associated with masking (after controlling for reactance).

#### **Norms**

Reactance theory proposes that people acquire beliefs about their freedom to enact certain behaviors through a variety of means including laws, permissions, and direct experience (Brehm, 1966). Another source of these beliefs, one that may be especially important to masking, is the behavior of others. Collectively, the behaviors of others are referred to as norms. As a rule, people are expected to behave in accordance with norms. There are, however, important variations on these general ideas. For one, *descriptive norms* refer to beliefs grounded in observation of others (Lapinski & Rimal, 2005; but see Rimal & Storey, 2020 for an analysis of other sources of information). Thus, descriptive norms describe. They are estimates of the typicality or prevalence of a behavior based on the perceived frequency of occurrence, especially among similar others.

Given the purpose of our study, we focused on anti-masking descriptive norms, that is, the perceived frequency of exposure to others who were not wearing masks or wearing them improperly. We reasoned that a stronger anti-masking descriptive norm would be seen as evidence of the freedom of others to go about unmasked. This should, in turn, strengthen the observer's belief in their own freedom to do the same, thereby enhancing the likelihood of reactance to messages that demand masks be worn (i.e., *MUPU*).

**H6:** Anti-masking descriptive norms are positively associated with perceptions of the *MUPU* campaign as a threat to freedom.

*Injunctive norms* are a conceptually distinct type of normative belief (Deutsch & Gerard, 1955; Lapinski & Rimal, 2005). In contrast with descriptive norms, injunctive norms carry the weight of *ought* and *should*. These terms indicate social approval and imply that individuals who engage in counter-

normative behavior may be subject to social sanctions (Morris, 1956). With respect to masking, injunctive norms may be conveyed as overt approval by some persons and overt disapproval by others. Interpersonal messages that are critical of masking communicate an anti-masking injunctive norm that runs counter to the goal of the *MUPU* campaign. Such messages might be perceived as social support for the view that masking is an unjustified intrusion on one's personal autonomy, which would amplify reactance.

Conversely, communicative exchanges in which individuals are observed asking or telling others to wear a mask constitute behavioral evidence of a pro-masking injunctive norm. These messages may diminish the belief that one is free to go unmasked and, consequently, reduce perceived threat to freedom from the *MUPU* campaign. However, the reverse logic is also plausible. Anti-masking messages might underscore the reality that students could go unmasked, regardless of the campaign's efforts. But, pro-masking messages could amplify reactance to the campaign if the observer was ideologically committed to an anti-masking position. Thus, we offered competing hypotheses:

**H7:** Frequency of exposure to an *anti-masking* injunctive norm is (a) positively or (b) negatively associated with perceptions of the *MUPU* campaign as a threat to freedom.

**H8:** Frequency of exposure to a *pro-masking* injunctive norm is (a) positively or (b) negatively associated with perceptions of the *MUPU* campaign as a threat to freedom.

### Complexities in predicting masking behavior

Thus far, we have focused only on simple effects. But attention to past research and the basic notion of audience segmentation suggests that such a focus may be simplistic. For example, the theory of normative social behavior proposes that group identity will interact with norms to determine behavior (Rimal & Real, 2003). Given the polarization between liberals and conservatives with respect to masking (Lizza & Lippman, 2020), we wished to test for the effect of political ideology in combination with the exposure and norm variables discussed above.

**RQ1:** Does political ideology interact in its effects on threat to freedom with campaign exposure, anti-masking descriptive norms, anti-masking injunctive norms, or pro-masking injunctive norms?

Li and Sundar (2021) report a study of bandwagon cues, operationalized in their study as the number of likes on a website. This behavior – clicking to express evaluation – can be seen as a type of descriptive norm. The results showed that bandwagon cues exert direct and indirect (via reactance) effects on message persuasiveness. Although the findings are interesting in their own right, they also highlight a broader issue: The variables in the current study have the potential to serve dual roles in determining behavior. That is, campaign exposure, political ideology, and social norms may directly and indirectly (via reactance) influence masking. Hence, to better

evaluate the impact of reactance on campaign effects, the alternative pathways that operate above and beyond reactance should be investigated simultaneously. We asked:

**RQ2:** To what extent, if any, do campaign exposure, political ideology, anti-masking descriptive norms, anti-masking injunctive norms, and pro-masking injunctive norms influence masking, independent of the reactance process?

## Method

### Participants

The initial sample consisted of 1208 students enrolled in a general education course at the Pennsylvania State University. Following approval of the Institutional Review Board, these students were offered a small amount of course credit in return for their participation. Although the campaign was rolled out on August 12, 2020, we were unable to access research participants until September 17, 2020. On that day, we initiated a rolling cross-sectional survey, which took place over a period of eight weeks, ending on November 11, 2020, the final week of in-person instruction for the fall semester. Invitations to participate were issued every Thursday about noon to a random subset (roughly  $n = 151$ ) of the total available subjects.

Respondents were filtered out if they (a) were less than 18 years of age, (b) took longer than 1.5 hours to complete the survey, or (c) were residing outside of Centre County, where the university is located. Together with nonresponse, this yielded a total of 706 subjects. After eliminating individuals who reported no exposure to the campaign, the final  $N$  was 681, an average of 85 valid responses per week. Table 1 provides a description of the final sample.

### Procedure

After providing informed consent,<sup>1</sup> participants completed an online survey that consisted of three blocks. The first block gathered sociodemographic data and information about their experiences with the pandemic. The second block focused on their knowledge of and reactions to the campaign. Participants indicated whether they had seen or heard about a Penn State COVID-safety campaign and whether they were able to recall its theme or slogan. Next, participants were randomly assigned to view one of ten static images or one of three 30-second messages from the campaign. They were asked to report the number of times they had seen it and to make a series of judgments about the campaign overall. The third block focused on safety behaviors. Average time to complete the survey was 12.82 minutes.

### Missing data

Across the variables used in the study, missing data varied from 0% to 2.3%. For sociodemographic variables, we imputed mean or modal values for continuous or categorical variables, respectively. For substantive indices, values were imputed within cases based on individual patterns of response to other items within the relevant item cluster.

**Table 1.** Description of the sample.

	<i>n</i>	%
Gender		
Female	375	55.1
Male	299	43.9
Transgender woman	1	0.1
Genderqueer/gender non-conforming	3	0.4
Prefer not to answer	3	0.4
Ethnicity		
Hispanic	19	2.8
Asian	52	7.6
Black or African American	13	1.9
White	550	80.8
Multi-ethnic	34	5.0
Other	3	0.4
Prefer not to answer	10	1.5
Year in school		
Freshman	81	11.9
Sophomore	280	41.1
Junior	237	34.8
Senior	81	11.9
Other	2	0.3
Political ideology		
Extremely liberal	37	5.4
Liberal	155	22.8
Slightly liberal	84	12.3
Moderate	176	25.8
Slightly conservative	112	16.4
Conservative	106	15.6
Extremely conservative	11	1.6
In Greek life		
Yes	176	25.8
No	505	74.2
Living in dorm		
Yes	202	29.7
No	479	70.3
Age	<i>M</i> = 19.66, <i>SD</i> = 1.15	

## Measures

### Political ideology

Participants indicated their political ideology using a single 7-point response scale (1 = *extremely liberal*, 2 = *liberal*, 3 = *slightly liberal*, 4 = *moderate*, 5 = *slightly conservative*, 6 = *conservative*, and 7 = *extremely conservative*). Table 2 provides summary statistics for this and other variables.

### Campaign exposure

Participants reported how many times they had ever seen (a) the particular campaign message that they were shown and (b) similar campaign messages from official university sources. Both items were measured on 7-point response scales (1 = *never*, 2 = 1–5

*times*, 3 = 6–10 *times*, 4 = 11–15 *times*, 5 = 16–20 *times*, 6 = 21–25 *times*, 7 = 26 or more *times*). We then created a campaign exposure variable by averaging the two items. Because the items were considered formative indicators, alpha reliability was not relevant (Bollen & Diamantopoulos, 2017). Participants who reported 1 (= never) to both questions were removed.

### Anti-masking descriptive norms

Participants were asked to indicate how many times they saw someone who was not wearing a mask or not wearing a mask properly in the past week. The measure included eight items (e.g., “outside off campus, when less than six feet apart” and “inside of a campus teaching building”) evaluated on an 8-point scale (0 *times* to 7 or more *times*). The items were averaged to create an index of formative indicators.

### Pro- and anti-masking injunctive norms

To measure masking injunctive norms, participants were presented with the stem, “In the past week, how many times did you see someone . . .” which was followed by three items measuring pro-masking injunctive norms (“ask or tell another person to adjust their mask so that it was worn correctly,” “ask or tell another person to wear a mask [who wasn’t wearing one],” “get angry at someone else for not wearing a mask”) and three items indexing anti-masking injunctive norms (“make fun of someone else for wearing a mask,” “say that it was OK to relax a little about wearing a mask,” “get angry at someone else for wearing a mask”). Responses were solicited using an 8-point scale (0 *times* to 7 or more *times*). The items for pro- and anti-masking injunctive norms were averaged to create formative indices, respectively.

### Threat to freedom

Perceived threat to freedom was assessed using two items from Dillard and Shen (2005): “The campaign is trying to pressure me” and “The campaign is trying to control me.” Responses were measured on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*).

### Reactance toward the MUPU campaign

Participants’ reactance was measured using scales that assess anger and critical cognitions. We asked them to consider the emotions they felt and thoughts they had about the campaign. Anger was assessed using two items (angry and irritated;

**Table 2.** Descriptive statistics and correlations.

	1	2	3	4	5	6	7	8	9
1. Political ideology	–								
2. Campaign exposure	–.07	–							
3. Anti-masking descriptive norms	–.05	.19**	–						
4. Pro-masking injunctive norms	–.09*	.22**	.32**	–					
5. Anti-masking injunctive norm	.10**	.04	.30**	.32**	–				
6. Threat to freedom	.40**	–.01	.11**	–.03	.16**	.85			
7. Anger	.34**	.04	.19**	.03	.26**	.56**	.88		
8. Critical cognitions	.34**	–.07	.13**	.01	.24**	.52**	.69**	.89	
9. Masking behavior	–.33**	.09*	–.15**	–.06	–.33**	–.34**	–.39**	–.38**	–
Scale endpoints	1/7	1/7	0/7	0/7	0/7	1/5	0/4	1/5	1/5
<i>M</i>	3.78	3.91	1.63	0.85	0.42	2.22	0.44	1.80	4.73
<i>SD</i>	1.55	1.83	1.25	1.16	0.86	1.25	0.87	1.04	0.63

*N* = 681. Reliability estimates for threat to freedom, anger, and critical cognitions appear in the diagonal.

\**p* < .05. \*\**p* < .01.

Dillard & Shen, 2005) on a 5-point scale (0 = *none of this feeling*, 4 = *a great deal of this feeling*). Critical cognitions were also assessed using two items (“I have critical thoughts about the campaign” and “I think that I dislike the campaign”) using a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*).

### Masking

A single item asked respondents how often they wore a facemask when out in public in the past week. Responses were solicited using a 5-point scale (1 = *never*, 2 = *sometimes*, 3 = *about half the time*, 4 = *most of the time*, 5 = *always*).

### Week of data collection

The fact that data were collected over an eight-week period created the potential for events external to the campaign to produce cumulative effects. To account for those effects, we created a variable *week* with values ranging from 1 to 8.

### Plan for analysis

Following item-level analyses, composite manifest variables were created for the norms variables. Threat to freedom and reactance were treated as latent constructs whose errors of measurement were fixed at  $(1 - \alpha)\sigma^2$ . Because the relative contributions of critical cognitions and anger were of interest, they were treated as separate indicators of reactance. The structural equation model that represented the entire set of hypotheses and research questions was evaluated in terms of fit to the data using the following guidelines for preferred values:  $\chi^2/df < 3$ , Tucker-Lewis Index (TLI)  $> .94$ , standardized root mean residual (SRMR)  $< .08$ , root mean squared error of approximation (RMSEA)  $< .08$ , and the probability of close fit, PCLOSE  $> .05$  (Hu & Bentler, 1998, 1999). Analyses were carried out using AMOS version 27.

## Results

### Structural equation modeling

We first specified a structural equation model that consisted of the two-step sequence in which threat to freedom causes reactance which causes masking. To this basic model, we added (a) the main effects of the exogenous variables: week of data collection, campaign exposure, political ideology, anti-masking descriptive norms, and both types of injunctive norms; and (b) the mean-centered product terms to represent the interactions of political ideology with campaign exposure, descriptive norms, and both types of injunctive norms. Causal paths were drawn from the exogenous variables to threat to freedom and to masking.

This model fit the data well:  $\chi^2(21) = 33.40$ ,  $p = .042$ ,  $\chi^2/df = 1.59$ , TLI = .96, SRMR = .014, RMSEA = .029 (90% CI [.006, .048]), PCLOSE = .97. But, because it contained many nonsignificant paths,<sup>2</sup> we trimmed them one at a time until only significant paths remained. The sole exception was the effect of descriptive norms on masking. Although it was nonsignificant, it was retained because descriptive norms participated in an interaction effect with political ideology on masking that was significant. The final obtained model produced the following fit

statistics:  $\chi^2(16) = 29.72$ ,  $p = .019$ ,  $\chi^2/df = 1.86$ , TLI = .97, SRMR = .021, RMSEA = .036 (90% CI [.014, .055]), PCLOSE = .88. These model-level indices suggested good overall fit, so we turned our attention to the relationships between variables (see Figure 1).<sup>3</sup>

### Control variable: Week

As noted earlier, week of data collection was included in the model as a control variable for extraneous events. Week had a positive path to threat (standardized coefficient: .13,  $p < .0001$ ).<sup>4</sup> Thus, perceived threat to freedom increased over time.

### Hypotheses and research questions

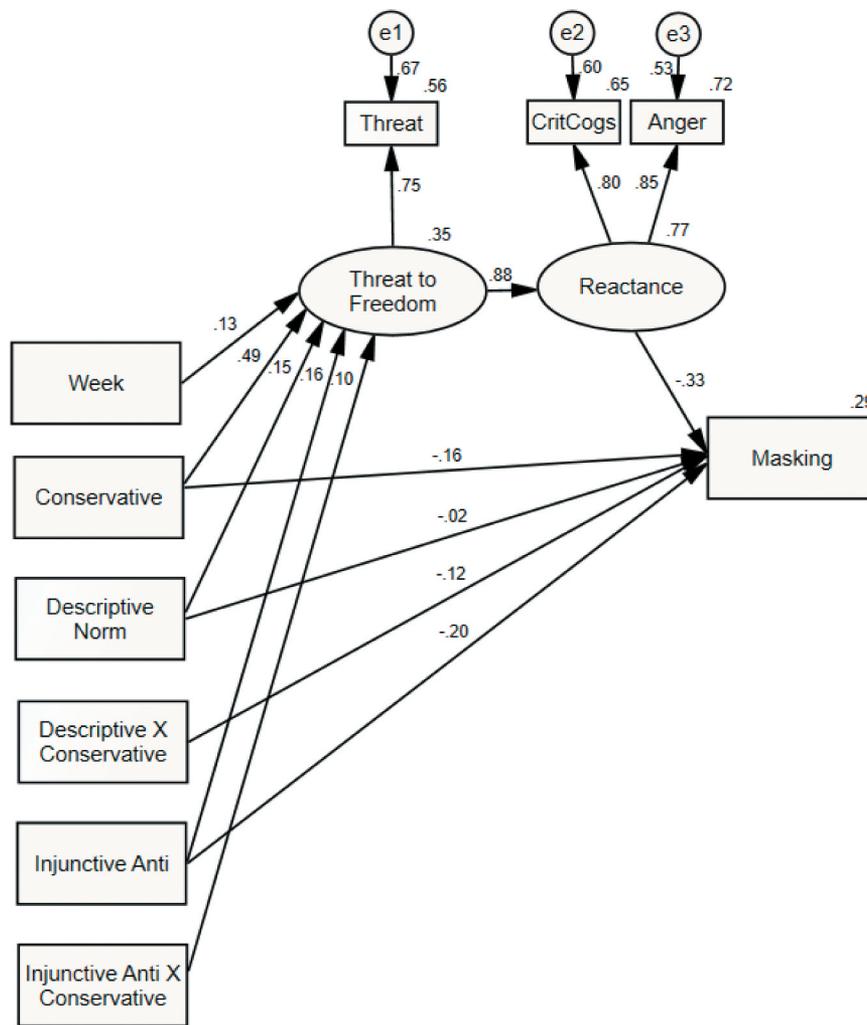
As shown in Figure 1, there was a positive path from threat to freedom to reactance, consistent with H1 (.88,  $p < .0001$ ). Furthermore, as anticipated by H2, reactance had a negative path to masking ( $-.32$ ,  $p < .0001$ ). These two findings confirmed the basic reactance process.

It was expected that conservative political ideology would be positively associated with perceived threat to freedom (H3). This hypothesis was supported (.45,  $p < .0001$ ).

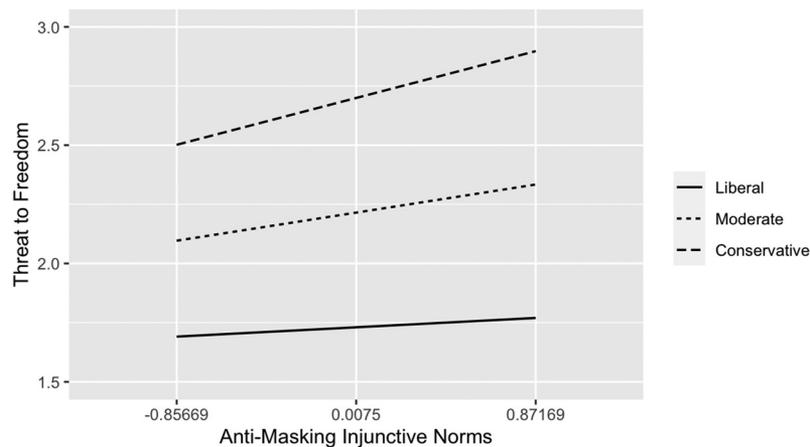
H4 predicted that higher levels of campaign exposure would be associated with higher levels of perceived threat to freedom. Because the observed path coefficient was nonsignificant, this hypothesis was not supported. H5 anticipated a direct positive relationship between exposure and masking, and this hypothesis was not supported. Thus, frequency of exposure to the campaign appeared to have no impact on masking, either directly or indirectly.

H6-8 and RQ1 focused on the main effects of norms and their interactions with political ideology on threat to freedom. The frequency with which respondents observed others not wearing a mask (i.e., the anti-masking descriptive norm) had a positive path to threat to freedom (.14,  $p < .0001$ ). Thus, H6 was supported. The interaction of anti-masking descriptive norms with political ideology was nonsignificant (RQ1).

H7 and H8 considered the effects of anti- and pro-masking injunctive norms, respectively, on threat to freedom. Consistent with H7a (but not H7b), anti-masking injunctive norms had a positive path to threat to freedom (.15,  $p < .0001$ ). The interaction of anti-masking injunctive norms with political ideology (RQ1) was also statistically significant (standardized coefficient: .10,  $p = .015$ ). To unpack the interaction effect, we computed simple slopes for the regression of threat to freedom onto anti-masking injunctive norms when political ideology was conservative (one *SD* above the mean), moderate (at the mean), or liberal (one *SD* below the mean) (Aiken & West, 1991). Figure 2 shows that anti-masking injunctive norms had no significant effect on perceived threat to freedom among liberals. The data showed a weak positive effect for political moderates and a stronger positive effect for conservatives. For pro-masking injunctive norms, neither the main effect nor the interaction was significant. Thus, neither H8a nor H8b was supported.



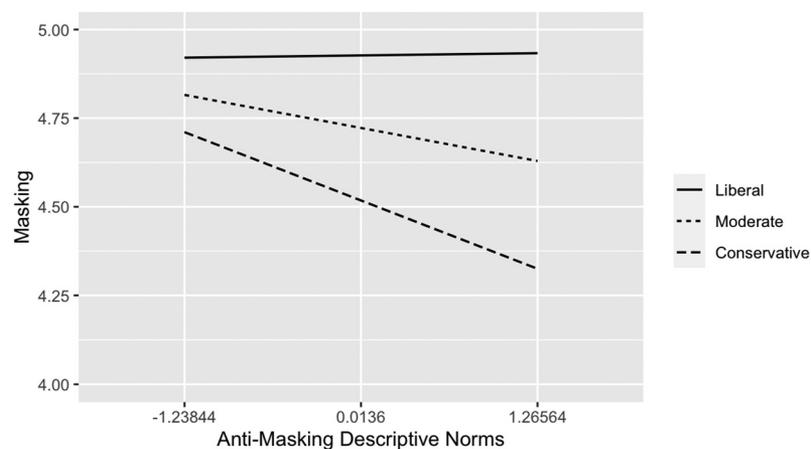
**Figure 1.** Final structural model. Model presents standardized path coefficients. Not shown are covariances among exogenous variables (see Table 2) and disturbance terms for the endogenous variables. Fit statistics were:  $\chi^2(1) = 29.72, p = .019; \chi^2/df = 1.86, TLI = .97, SRMR = .021, RMSEA = .036$  (90% CI [.014, .055]), PCLOSE = .88.  $R^2$  values are given at the upper right corner of each of the endogenous variables.



**Figure 2.** Interactive effect of political ideology and anti-masking injunctive norms on threat to freedom.

RQ2 focused on the potential for the exogenous variables to influence masking behavior through processes other than reactance. The results showed that most of the variables did so. Conservative political ideology had a negative path to masking

( $-.12, p = .001$ ). The main effect of anti-masking descriptive norms was non-significant ( $-.01, p = .802$ ), but it was retained in the model nonetheless because it contributed to a significant interaction with political ideology ( $-.11, p < .0001$ ). As Figure 3



**Figure 3.** Interactive effect of political ideology and descriptive norms on masking.

shows, variations in anti-masking descriptive norms had no discernable impact on masking among liberals. However, the data showed a weak negative effect among moderates such that higher levels of anti-masking descriptive norms were associated with reduced masking. This negative effect was stronger among conservatives.

## Discussion

### The Mask Up or Pack Up campaign

#### Campaign effects

Research has found that some persuasive health campaigns produce the sought-after change in behavior, others seemingly have no impact, and still others yield change, but in the direction opposite of that which was desired (Hornik, 2002). We tested for the possibility that the MUPU campaign would simultaneously produce both desired effects, via comprehension and repetition, and undesired effects, via reactance. Despite a significant bivariate correlation between frequency of exposure and masking behavior (Table 2), the path coefficient was nonsignificant. Thus, our best effort to model the totality of effects on masking indicated that the frequency of exposure had no discernable effect. The effect of exposure on the components of reactance was nonsignificant in both the bivariate and SEM tests. Obviously, our model is a *model* of reality, not reality itself. This is an important caveat to our findings and, in fact, to all studies that utilize models of any kind. That said, the data showed no effect for frequency of exposure.

Still, the apparent absence of an association does not mean that the *campaign* had no impact. When respondents – all of whom reported some exposure to the campaign – were asked whether they felt that it pressured or tried to control them, 60% of them said that they did. And to the extent that they subsequently experienced a combination of anger and critical cognitions, they also reported reduced masking. Thus, it appears that the existence of the campaign was sufficient to instigate the reactance process, regardless of the number of messages to which participants were exposed. This suggests that we should think of this campaign as a binary: Irrespective of dosage, it had an effect on some individuals and not others.

### Applying the logic of attribution science

In the last 15 or so years, climate scientists have developed a set of techniques whose purpose is to provide quantitative estimates of the effect of climate change on extreme weather events. Collectively, these procedures are known as *attribution science* (Van Oldenborgh et al., 2021). Although technically complex, the logic of the approach is both elegant and simple: Model the association between climate and the weather event once with anthropogenic emissions (reality) and once without (counterfactual). The difference reflects the degree to which the extremity of the event is attributable to climate change.

In a similar fashion, it is possible to derive a quantitative estimate of the degree to which masking would have occurred with and without the MUPU campaign. This involves two steps. First, compute the predicted value for masking based on the model in Figure 1, that is,  $\hat{Y}$  *with* reactance. This involves summing the products of the mean value and unstandardized path coefficients for each variable in Figure 1 that directly predicts masking (= 4.538). Next, estimate  $\hat{Y}$  *without* reactance by repeating that process, but this time without the reactance terms (= 4.777). Divide the difference (= .24) by the upper bound of the scale (i.e., 5 on our 1–5 scale) for a result of .048. These calculations suggest that had the campaign not been fielded at all, the mean level of masking would have increased by about 5%. We emphasize that this is a hypothetical estimate. It assumes that the model in Figure 1 is correct, and it is limited to the circumstances in which the campaign took place – a pandemic in a highly politicized environment with active pro- and anti-masking forces at work. Nonetheless, it appears that the campaign itself was a disservice to the community. From a public health standpoint, conditions would have been improved had it been eliminated altogether.

### Explaining the campaign existence effect

To the best of our knowledge, this campaign-effect-absent-a-frequency-of-exposure-effect is a novel result in the reactance literature. Why might it have occurred? One possibility is that it followed from an overbearing campaign theme: The tagline alone was sufficient to instigate reactance. But, we cannot rule out the possibility that the context was so

overheated that any campaign would have produced reactance. Consider that masking and other pandemic-related issues were the topics of daily media coverage, much of which dealt with conflicting, emotionally-charged narratives concerning health, economics, and politics. It is conceivable that variations in campaign exposure were swamped by the flood of mass and interpersonal messages about COVID-19. On this view, individuals may possess some threshold for tolerance of any given topic (cf., So et al., 2017). It is the sum of exposure via all sources that determines when that threshold is attained. Once it is reached, variations in exposure from any source are no longer linked to desired or undesired effects.

## Implications for reactance theory

### Instigators of reactance

Although reactance theory has traditionally emphasized psychological questions, it has implications for a multitude of social phenomena. Our study explored this issue in several ways. First, it focused on masking, a public behavior fraught with identity implications (Rimal & Storey, 2020). Second, our study considered political ideology, a social category variable that played a central role in the controversy around masking. It further considered social phenomena by examining perceptions of the interpersonal *behavior* of others (i.e., anti-masking descriptive norms). And it did so, finally, by testing the effects of perceived interpersonal *communication* about mask-wearing among others (i.e., injunctive norms). Alone and in combination, these factors showed themselves to be important contributors to the reactance process and the outcome behavior of interest, that is, masking.

As noted by many media reports (e.g., Aratani, 2020), conservatives masked less frequently than liberals. In addition to their subscription to anti-masking political rhetoric, a reason for this difference might be reactance to COVID-19 safety campaigns. Because contemporary conservative discourse so heavily emphasizes personal freedom, health directives urging individuals to mask up have been characterized as assaults on freedom (Krugman, 2021). We anticipated that students who identified as conservatives would be more likely than liberals to see the campus campaign as a source of pressure and, thus, an instigator of reactance. Not only were the results consistent with this expectation, but political ideology emerged as the most potent instigator of reactance examined in this study.

Reactance theory asserts that beliefs about personal freedoms can arise from observation of the behavior of others. Our data showed that the more frequently respondents saw others unmasked, the more they perceived the campaign as a threat to freedom. Hence, passive observation of others can provide a launching pad for the reactance process. This finding is broadly consistent with Li and Sundar's (2021) paper, which showed that reactance was reduced when larger numbers of viewers expressed liking for anti-drinking public service announcements. The difference in direction of the findings exists only because behavior and message advocacy were consistent in their study (an anti-drinking advocacy and

endorsement of that position), whereas they were opposed in our project (an anti-masking norm coupled with a measure of masking).

Norms can also be articulated explicitly. We assessed anti-masking injunctive norms by asking respondents how frequently they saw or heard someone say that it was OK to relax about masking or to make fun of or get angry at someone else for wearing a mask. These communicative behaviors convey disapproval of masking. Not surprisingly, seeing evidence of an injunctive anti-masking norm produced higher levels of reactance to a campaign that instructed students to do the opposite. Although the result showed conceptual alignment with the effect of descriptive norms on reactance, it was distinct from it. Just as descriptive and injunctive norms have been shown to produce distinct effects on behavior (Rimal & Real, 2003), so do they produce distinct effects on reactance. We note that the anti-masking injunctive norm effect is especially potent among political conservatives (see Figure 2).

The data did not, however, show a mirror image effect for pro-masking injunctive norms. We suspect that two factors were responsible for this non-effect. First, with the mean level of masking at 4.73 on a 5-point scale, there was little room for movement toward the upper bound of the scale. In statistical terms, this is a problem of restricted range. Second, it seems likely that the majority of students took seriously the public health concerns around the virus. If so, the direction of the campaign advocacy (i.e., mask up) was consistent with their own position. Being instructed to take an action that one already planned to take does not rule out any possibility of reactance, but it surely diminishes it. Either alone or in combination, these factors may be sufficient to explain the apparent absence of effects for pro-masking injunctive norms.

### Threat alone versus threat plus reactance

Apart from the specifics of our study, it is notable that there is variation in the literature regarding the conceptual status of threat to freedom versus reactance. Ratcliff (2021) captures the situation thusly: "Freedom threat is sometimes treated as an antecedent [of reactance] and other times as a measure of reactance itself, reflecting differing conceptualizations of the construct" (p. 7). We find this puzzling because the theory so clearly delineates threat and reactance as different concepts, one of which is the cause of the other (Brehm, 1966; Brehm & Brehm, 1981). If one wishes to study the *theoretical process*, the distinction must be maintained.

But, perhaps, theory is not the goal. It might be argued that the pertinent question for health communication is a pragmatic one: Why does it matter if the two concepts are conflated or one is substituted for the other as long as we can predict behavior? In our view, this position gives short shrift to the most powerful tool available to practitioners: A strong and clear *explanation* for message effects. Of course, on occasion, practical constraints such as limited financial resources or concern about subject fatigue demand theoretical sacrifices. In such instances, we suggest that researchers avoid making claims about the reactance process. Any such assertions are crippled when only a portion of the process is actually measured.

### **Social influences on masking: Politics and norms**

Because reactance is only one of the many potential processes that might result from a campaign or cause behavior change, we also tested for the direct effects of other variables on masking. The results revealed that politics and norms did indeed shape behavior in ways that were independent of reactance. In fact, the sum of all of the direct effects in the final model on masking (.17) was substantially larger than the sum of the indirect effects via reactance (.04) (excluding the impact of week). In this instance, the impact on behavior of the contextualized interpersonal variables – politics and norms – was much greater than the influence of the campaign. Like reactance, however, all of the other indices in the final model were associated with reduced masking.

Political ideology, for example, showed a direct negative effect on masking, which might be explained by referencing the social meanings attached to masking. By wearing a mask or not, individuals were publicly signaling their position on a broader set of value issues including individualism versus collectivism, personal freedom versus civic responsibility, and support for one presidential candidate versus the other (Lizza & Lippman, 2020; Rimal & Storey, 2020). Consistent with this account, the interaction between political ideology and anti-masking descriptive norms revealed that simply observing the non-masking behavior of others was a potent trigger for similar behavior among conservatives, though it had no discernable impact on liberals (see [Figure 3](#)). This pattern of data underscores the complexity of ideology as an explanatory variable. Ideology functioned not only as a proxy for the desire for autonomy (a necessary condition for reactance), but also as a badge of social identity that influenced masking independent of reactance. This should serve as an important reminder that the liberal-conservative continuum is a sloppy amalgamation of many underlying beliefs and values that happen to cohere at a given moment in history. Studies of ideology alone are certainly useful, but deeper theoretical understanding can be derived from work that identifies the particular conceptual substrate of ideology that motivates specific types of behavior (e.g., Ma et al., 2019).

Injunctive anti-masking norms also contributed directly to non-masking behaviors, but we saw no indication that this effect was conditioned on political ideology. This latter finding implies an explanation that is less dependent on identity politics and more plausibly the result of the strictures of immediate social interaction. Such a view is consistent with earlier writers who have proposed that descriptive and injunctive norms are not only discrete concepts, but they also produce unique effects via different mechanisms (Chung & Rimal, 2016).

### **Strengths & limitations**

It is common for researchers to bemoan the use of student samples. Yet, studies of campus-level campaigns are of considerable pragmatic importance given the risk that in-person education will increase infection rates. One study found that COVID-19 case rates were 50% higher in counties with universities or colleges that allowed in-person instruction compared with counties in which educational institutions used remote-only instruction (Leidner et al., 2021).

We were unable to access research participants until a month after students had returned to campus and the campaign had launched. Thus, we missed the early phases of the campaign, which might have produced different effects than those that we observed. Our data did, however, represent a complete capture of the remaining weeks of in-person instruction for the fall semester.

A significant limitation to inference lies in the nature of our data, which for the main questions of theoretical interest, were cross-sectional. This limits our ability to draw any sort of causal inference. However, our analyses did include a variable – week – that represented time of data collection, which served as a proxy for all of the events that cumulated over the period of the study. Inclusion of week in our analyses allowed us to draw process conclusions that controlled for the influence of time and history. The fact that time influenced reactance and masking reminds us of the obvious, but under-appreciated point that campaigns are dynamic operations and should be studied as such.

There are several measurement-related issues that merit mention. Some of our measures were single-item or a small number of items. To the extent that these indicators were unreliable, they likely created false negative results. We note also that our norm indices measured perceptions of the behavior of others, not beliefs about how others thought that respondents should behave. If beliefs are more proximal to action, our measures may have diminished the obtained effect sizes (cf. Geber et al., 2019).

Finally, we note that [Figure 1](#) provides a model of influences on masking behavior. As noted earlier, although models can be useful, they are representations of reality, not reality itself. Different variables or different configurations of the same variables could lead to different inferences.

### **Conclusion**

This project sought to study theoretical processes underlying a campus COVID-safety campaign. Our data suggested that the overall impact of the campaign was small, but counter-productive, and not at all dependent on variations in exposure. The most potent drivers of behavior were politics and the actions of others (i.e., norms), both of which were largely beyond the reach of the campaign. At the theoretical level, the results illustrate ways in social phenomena can be integrated with the study of reactance and, conversely, how reactance might shed light on theories of normative behavior. Finally, the project demonstrates the importance and multi-functionality of political ideology to understanding a behavior that we anticipate will be a concern for many years to come, that is, masking.

### **Notes**

1. Approved by the Institutional Review Board of Penn State University (STUDY00016109).
2. Unstandardized regression weights for the initial model are given in Supplemental File 1.
3. Although model fit statistics are informative with respect to the ability of a particular model to reproduce the data structure, it is possible that many other models fit the data equally well (MacCallum et al., 1993). To provide an explicit test of an alternative, we constructed a model

that reversed the location of threat to freedom and reactance in the final obtained model. In other words, rather than reactance mediating the effect of threat on masking, threat to freedom was drawn such that it mediated the effect of reactance. Exogenous variables were specified to cause reactance, while leaving their direct effects on masking as shown in Figure 1. The resulting fit indices were  $\chi^2(15) = 41.16$ ,  $p < .0001$ ,  $\chi^2/df = 2.74$ , TLI = .94, SRMR = .022, RMSEA = .051 (90% CI [.032, .069]), PCLOSE = .445. Most of the indices indicated satisfactory fit. However, direct comparison of the AIC values for the obtained (AIC = 108.43) and alternative models (AIC = 121.16) favored the obtained model. Smaller AIC values are preferable and absolute differences larger than 10 (here the difference is 12.73) constitute strong evidence that one model is superior to the other (Burnham & Anderson, 2004).

- Unstandardized regression weights for the final model are given in Supplemental File 2.

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