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Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

What factors underlie attitudes regarding protective mask use during the COVID-19 pandemic?

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ARTICLE INFO

Keywords:
 COVID-19
 Attitudes
 Health

ABSTRACT

Two studies examine psychological and demographic factors that predict attitudes toward mask-wearing during the COVID-19 pandemic. These studies differentiate pro-mask from anti-mask attitudes. Political conservatism, younger age, and gender predicted anti-mask attitudes but were unrelated to pro-mask attitudes. Psychological reactance was associated with anti-mask attitudes, over and above demographic variables. Empathy, trust in healthcare professionals, and perceived normativity of mask wearing were associated with pro-mask attitudes, over and above demographic variables. These studies suggest that demographic variables such as political orientation and age are associated with anti-mask but not pro-mask attitudes, but also that psychological factors differentially predict anti- and pro-mask attitudes over and above demographic factors.

"Mask Rules Expand Across U.S. as Clashes Over the Mandates Intensify"

-The New York Times, August 2020

1. Introduction

The United States has become increasingly politically polarized in recent years, and the COVID-19 pandemic has fanned the flames of that polarization. Whereas some people emphasize preventing the spread of the virus via social restrictions, others prioritize a return to normalcy with an emphasis on civil liberties. At the center of this debate is whether people should be required to wear masks in public during the pandemic. Even as vaccines roll out, face coverings remain one of the best preventive measures available to stem virus transmission by keeping droplets from spreading to others (CDC, 2020a). However, many people remain resistant to adopting masks as a widespread preventative strategy. What variables differentiate mask supporters from mask opponents? Although demographic and political variables such as age, gender, and political ideology may account for some of the divide in the mask debate, some of the variability in people's attitudes toward wearing masks might be explained by psychological variables. Indeed, scholars have emphasized the importance of drawing upon psychological research in thinking about pandemic responses (Van Bavel, Baicker,

et al., 2020). Therefore, we conducted two studies with U.S. samples to identify the degree to which demographic, political, and psychological factors independently predict people's attitudes regarding the use of masks.

2. Demographic and political predictors of mask-use attitudes

Several demographic and political variables likely play a role in people's attitudes toward mask use. A wealth of anecdotal evidence, in addition to a growing body of scientific literature (Capraro & Barcelo, 2020; Gollwitzer et al., 2020; Makridis & Rothwell, 2020; Van Bavel, Cichocka, et al., 2020; Wagerman et al., 2021), suggests that, at least in the U.S., political ideology accounts for the divide in COVID-19 attitudes generally and mask use attitudes specifically, with liberals supporting preventive measures such as mask-wearing and conservatives opposing them. Indeed, many Republican officials, including former President Trump, have been hesitant to emphasize the importance of mask-wearing for public health (Yamey & Gonsalves, 2020). Pew polling during the summer of 2020 revealed that, compared to Republicans or Republican-leaning Independents, Democrats or Democratic-leaning Independents were two times more likely to say that masks should always be worn in public (Doherty et al., 2020).

In addition to political orientation, attitudes regarding masks likely vary by age. Rates of severe illness from infection and death from

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<https://doi.org/10.1016/j.paid.2021.111038>

Received 24 March 2021; Received in revised form 22 May 2021; Accepted 25 May 2021

Available online 29 May 2021

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COVID-19 are more common among older adults (CDC, 2020b). Consequently, Americans age 65 and older are more likely than younger Americans to say that people should wear masks in public (Doherty et al., 2020). More broadly, as people age, they tend to perceive themselves as more vulnerable to disease (Díaz et al., 2020; Wickman et al., 2008) and thus hold more positive attitudes toward and engage more in preventive health behaviors (Calasanti et al., 2013; Liang et al., 1999; Makhanova & Shepherd, 2020). In sum, like political orientation, age is a demographic characteristic expected to be associated with more positive attitudes toward mask use, because masks serve as tools to prevent spreading the virus to the most vulnerable.

Moreover, recent findings suggest that men may be more opposed to mask use than women and are less likely to approve of and comply with COVID-related restrictions such as mask mandates (Capraro & Barcelo, 2020; Galasso et al., 2020). Gender norms convey that men should be resilient and tough (Thompson & Pleck, 1986), and wearing a mask can be perceived as undermining these norms. Indeed, conformity to masculine norms relates to negative mask attitudes (Palmer & Peterson, 2020), particularly among politically conservative men (Mahalik et al., 2021). These findings are in line with research suggesting that men are less likely to engage in preventive health behaviors such as receiving flu shots (Vaidya et al., 2012). Thus, gender may play a role in mask use attitudes.

3. Psychological predictors of attitudes toward mask use

Although demographic and political variables undoubtedly play a role in mask use attitudes, psychological factors are also important and may play a critical role in mask use attitudes. There are a number of variables that might be expected to influence mask-use attitudes, including personality factors (e.g., neuroticism or conscientiousness) and attitudinal variables (e.g., right-wing authoritarianism, a social attitude dimension associated with having a conservative political orientation). We chose to focus on psychological factors known to play a key role in health-related attitudes in the broader health psychology literature and thus were expected to be relevant to mask-use attitudes. We also focused on variables that we thought would be more proximally related to mask-use attitudes, rather than broader factors such as personality traits or worldviews, because this focus allowed us to assess psychological mechanisms that might play an immediate role in decisions about whether or not to wear masks. We predicted that several psychological variables (reactance, fear, empathy, perceived norms, and trust of healthcare professionals) would play an important role in people's views toward the public use of masks, over and above effects of political ideology, age, and gender. Although a few studies have examined the role of some of these individual differences in attitudes regarding mask use (e.g., empathy and trust in science, Mahalik et al., 2021; fear of COVID, Shah et al., 2020), to our knowledge, no studies have examined them simultaneously or considered whether they have an impact on mask-use attitudes above and beyond demographic and political factors. Below we describe why we anticipate each of these psychological factors to relate to positive or negative mask use attitudes.

Psychological reactance may underlie opposition to mask use. People high in reactance generally resent being told how to behave and often respond by doing the opposite of what they are told (Brehm, 1966). According to reactance theory, people generally value the freedom to control their own behaviors. Being told what to do threatens this personal freedom and elicits reactance. Experiencing reactance motivates individuals to regain their freedom (Brehm & Brehm, 2013). Research in health psychology finds that messages intended to promote healthy behaviors can create reactance, leading people to become less likely to engage in the promoted behaviors (Dillard & Shen, 2005; Erceg-Hurn & Steed, 2011; Miller et al., 2007). For example, one study found that, in response to anti-smoking ads, smokers high in reactance were less motivated to quit smoking than smokers low in reactance (Hall et al., 2016). Thus, being told to wear a mask by health officials may lead

people high in reactance to hold negative attitudes toward the use of masks.

Recommendations regarding masks are provided by scientists and medical professionals, and degree of trust in those sources could impact mask-related attitudes. Indeed, some evidence suggests that distrust in the scientific community is related to more negative attitudes regarding masks (Mahalik et al., 2021). This is sensible, as persuasion attempts are more successful when the source of information is trusted and viewed as a source of expertise (Petty & Cacioppo, 1986; Wilson & Sherrell, 1993). Trust in medical professionals is particularly important for compliance in the healthcare domain (Clayman et al., 2010; Meredith et al., 2007). People who trust healthcare providers are particularly likely to engage in proactive health behaviors, such as routine checkups (Musa et al., 2009). In contrast, people are less likely to engage in recommended health behaviors when they distrust health care professionals and scientists, especially when the recommendations are inconsistent with their personal beliefs (Nisbet et al., 2015). Because some people perceive scientists' recommendations regarding mask-wearing as inconsistent with their values (e.g., protecting civil liberties), they may distrust the scientists who make those recommendations. Consequently, we anticipated distrust in healthcare professionals would be associated with negative attitudes toward mask use.

Fear is a highly motivating emotion (Tappolet, 2009), and the COVID-19 pandemic induces fear in many people. Some evidence suggests that fear of contracting COVID-19 relates to more positive mask attitudes (Capraro & Barcelo, 2020; Shah et al., 2020). Similarly, in the broader health domain, people who fear a health event and perceive it as likely to affect them are more likely to engage in preventive behaviors (Maddux & Rogers, 1983). Meta-analytic evidence indicates that fear-based health messages are highly effective and often more persuasive than other types of messages (Witte & Allen, 2000). Consequently, we predicted that fear of COVID-19 would be associated with more positive attitudes toward mask use.

We were less sure whether attitudes regarding mask use would be related to individual differences in empathy, although some evidence suggests empathy is related to more positive mask attitudes (Mahalik et al., 2021; Pfattheicher et al., 2020).¹ Empathy is often related to increased prosociality (Eisenberg et al., 2010; Eisenberg & Miller, 1987). In the case of infectious disease, preventative health behaviors do not only protect oneself; they also protect other people. As a result, people high (versus low) in empathy may be more likely to engage in health behaviors aimed at reducing the spread of infectious disease. Indeed, high levels of empathy are associated with a greater likelihood of getting the flu vaccine and engaging in preventive behaviors such as hand-washing (King et al., 2016). Given that wearing a mask is most effective at preventing disease spread to others rather than preventing one's own contraction of the disease (CDC, 2020a), we thought if there was a relationship, individuals high in empathy would have more positive mask use attitudes.

Finally, mask use attitudes might be linked to people's perceptions of wearing masks as normative. Social norms are highly influential, and people tend to act in accordance with perceived norms (Ajzen, 1991; Terry & Hogg, 1996). In addition, this impact of social norms applies strongly to preventive health behaviors (Finlay et al., 1999; Sheeran et al., 2016). For example, perceiving protected sex, exercise, and eating healthy foods as normative is associated with increased positivity toward and engagement in those behaviors (Pender & Pender, 1985; Smith-McLallen & Fishbein, 2008; White et al., 1994). In the case of mask-wearing during the COVID-19 pandemic, efforts have been made to increase the normativity of mask-wearing, such as New York's "Masks Up, America" campaign (Governor's Press Office, 2020). And yet,

¹ We developed hypotheses and preregistration prior to the publication of these findings, which is why we were initially unsure about effects of empathy, despite now-published evidence pointing to the role of empathy.

because mask use varies among people and across communities, we anticipated that the degree to which one's friends, family, and local community tend to wear masks may be most relevant for determining perceived norms regarding mask use. We anticipated that people who perceive mask-wearing as more (vs. less) normative would have more positive attitudes regarding mask use.

4. The present work

We conducted two studies to test psychological factors potentially associated with attitudes regarding mask use, above and beyond key demographic and political variables (political ideology, age, and gender). To assess attitudes toward mask use, we had participants evaluate images of people wearing and not wearing masks in public places (e.g., grocery store). Because people regularly encounter and evaluate others in public, our strategy reflected a more ecologically valid approach than merely asking people to report their attitudes about masks in the abstract. We reasoned that our approach would also be less susceptible to social desirability biases than would asking people to report their personally held beliefs about masks.

Our studies assessed both pro- and anti-mask use attitudes. We operationalized pro-mask use attitudes as positive views of others who wear masks and negative views of those not wearing masks. Conversely, we operationalized anti-mask use attitudes as negative views of people who wear masks, and positive views of those not wearing masks. Differentiating between pro- and anti-mask use evaluations allowed us to separately consider factors that underlie support for versus opposition to mask use, which could not be achieved with a single item. Although pro- and anti-mask use evaluations may seem like two sides of the same coin, there is reason to expect differences between pro- and anti-attitudes. For example, a large body of research has considered whether prejudice is driven by support for the ingroup or opposition to the outgroup (Brewer, 1999). Relatedly, one criticism of the Implicit Association Test, a commonly used measure of automatic attitudes, is that it does not distinguish between pro- and anti-attitudes (De Houwer, 2002), and revised measures have been developed to allow for disentangling positive from negative attitudes (Karpinski & Steinman, 2006). In addition, considering political issue positions suggests support for political issues might be distinct from opposition to it (e.g., pro-choice positions focusing on women's reproductive rights and abortion opponents focusing on harm to an unborn child; Hout, 1999; MacInnis et al., 2014; Railsback, 1982). We expect that unique psychological variables may underlie pro- and anti-mask use evaluations, such that people's reasons for supporting mask use are not necessarily the inverse of their reasons for opposing mask use and vice versa.

Although we had no strong predictions about whether psychological factors would predict pro- versus anti-mask use attitudes, we did have predictions about the directionality of certain factors and mask attitudes more generally. We predicted that greater reactance and distrust of science would be related to negative attitudes toward mask use. We anticipated that greater fear of COVID-19 and perceived normativity of mask-wearing would be related to positive attitudes toward mask use. In addition, if empathy was related to mask use attitudes, higher empathy should be associated with positive mask use attitudes. We expected each of these hypothesized relationships to hold over and above demographic variables (political ideology, age, and gender). In Study 1, we focused on reactance and fear of COVID-19. In Study 2, we expanded our examination to consider trust in science, perceived normativity, and empathy.

We include all reported measures, data, and code on the Open Science Framework (https://osf.io/bf3g6/?view_only=d76e1920c7a243d3abe999dc8fa8b1af).

5. Study 1

Study 1 provided a preliminary examination of psychological factors that might underlie attitudes regarding mask use. Specifically, we

focused on fear of COVID-19 and resentment of the COVID-19 restrictions, which we use as a proxy for reactance to mask use in the present study. The latter construct reflected a form of reactance.

5.1. Method

5.1.1. Participants

We recruited 208 U.S. participants from Amazon's MTurk. We excluded participants who failed a simple attention check (e.g., "Select 'Strongly agree' for this item."), leaving a sample of 177 (49.1% female; 81.4% White; 36.2% liberal, 20.9% moderate, 42.9% conservative). Sensitivity analyses using G*Power indicated that the smallest effect size we could detect given our sample size and model is $r = 0.19$.

5.1.2. Materials and procedure

See Table 1 for internal consistency statistics. Participants completed a series of explicit attitude measures.² They first evaluated two male faces and two female faces. One of each gender wore a mask and one did not, and all were situated in a grocery store. Faces with and without a mask were counterbalanced between subjects. Participants were told to evaluate each target as if they encountered them in public. For each target, they reported the extent to which they liked them, wanted to avoid them, and perceived them to be moral on 1 (*Not at all*) to 7 (*Very much*) scales. They also reported the extent to which they felt positive (happy, relieved, grateful) and negative (angry, disappointed, frustrated, annoyed, disgusted, irritated) emotions toward the target on 1 (*Not at all*) to 7 (*Very much*) scales. Based on exploratory factor analyses, we combined the positive emotions, liking, and perceived morality items to create a measure of positive target evaluations.³ We combined the negative emotions and avoidance items to create a measure of negative target evaluations. We aggregated across target gender and examined correlations between positive and negative mask and no-mask target evaluations.⁴ Due to the high correlations between positive mask and negative no-mask judgments ($r = 0.66$) and positive no-mask and negative mask judgments ($r = 0.72$), we averaged the evaluation types in each set to create measures of pro-mask and anti-mask use attitudes. The pro-mask and anti-mask use attitudes were only weakly related to each other ($r = -0.25$). As a result, we examined them separately.

After the target evaluations, participants completed a 5-item measure assessing their fear of COVID-19 (e.g., "I am worried about COVID-19."; see materials on OSF for all items) on 1 (*Strongly disagree*) to 7 (*Strongly agree*) scales. On the same scale, participants then completed a 5-item measure capturing their resentment of COVID-19 precautionary restrictions (e.g., "COVID-19 restrictions have been unfairly forced on people."; see supplements for all items). Last, participants reported demographic information, including their general, social, and economic political ideology (1 = *Very liberal*; 7 = *Very conservative*), the gender with which they identified (1 = *Male*, 2 = *Female*, 3 = *Other*), political party identification, age, race, religion, religiosity, and sexual orientation. Only one person responded "other" for their identified gender, and we excluded this participant from analyses to allow gender to be dichotomous.

² Participants first completed an Implicit Association Test (IAT) that included pictures of targets in public places (see materials on OSF for images). Half the targets wore a mask and half did not. Results were weak and inconsistent and thus are not reported in the main text. See supplemental materials for results.

³ Details about the exploratory factor analyses can be found in the supplemental materials.

⁴ Preliminary examination of the data indicated patterns did not differ by target gender.

Table 1
Correlations and Descriptive Statistics for Study 1 Variables.

	1	2	3	4	5	6	7
1. Pro-mask use attitudes	–						
2. Anti-mask use attitudes	–0.25**	–					
3. Fear COVID-19	0.54***	–0.22**	–				
4. Opposed to COVID-19 restrictions	–0.34***	0.58***	–0.49***	–			
5. Political ideology	–0.04	0.23**	–0.26**	0.49***	–		
6. Age	–0.08	–0.30***	–0.06	–0.10	0.08	–	
7. Gender	0.06	–0.09	0.14	–0.08	–0.02	–0.17*	–
M	4.68	2.92	5.24	3.73	4.06	38.35	1.49
SD	1.39	1.39	1.30	1.70	1.77	11.94	0.50
α	0.95	0.95	0.87	0.92	–	–	–

*** $p < .001$.

** $p < .01$.

* $p < .05$.

5.2. Results and discussion

5.2.1. Correlational results

See Table 1 for correlations and descriptive statistics. Pro-mask and anti-mask attitudes were negatively correlated with one another. Fear of COVID-19 was correlated with greater pro-mask attitudes. Political ideology, age, and gender were uncorrelated with pro-mask attitudes. Opposition to COVID-19 restrictions was correlated with lower pro-mask attitudes. Opposition to COVID-19 restrictions and political conservatism correlated with greater anti-mask attitudes, whereas fear of COVID-19 and age correlated with lower anti-mask attitudes. Gender was uncorrelated with anti-mask attitudes.⁵

5.2.2. Regression results

To examine whether psychological variables accounted for unique variance in mask use attitudes above and beyond political ideology, age, and gender, we used hierarchical regression analyses to predict pro-mask use attitudes, and anti-mask use attitudes from political ideology, age, and gender in Step 1 and fear of COVID-19 and opposition to COVID-19 restrictions in Step 2. See Table 2 for results of regression analyses.

Political ideology, age, and gender were unrelated to pro-mask attitudes in Step 1. Fear of COVID-19 and opposition to COVID-19 restrictions together accounted for significant variance in pro-mask attitudes above and beyond political ideology, age, and gender ($\Delta R^2 = 0.33$, $\Delta F(2, 168) = 41.80$, $p < .001$). Unexpectedly, more conservative political ideology was related to higher pro-mask use attitudes in Step 2. Fear of COVID-19 was related to higher pro-mask attitudes, whereas opposition to COVID-19 restrictions was related to lower pro-mask attitudes. Age was unrelated to pro-mask attitudes.

More conservative political ideology and younger age were related to significantly greater anti-mask use attitudes in Step 1, and men had greater anti-mask use attitudes than women. Fear of COVID-19 and opposition to COVID-19 restrictions accounted for significant variance in anti-mask use attitudes above and beyond political ideology, age, and gender ($\Delta R^2 = 0.23$, $\Delta F(2, 168) = 31.99$, $p < .001$). In Step 2, fear of COVID-19 was unrelated to anti-mask use attitudes, whereas opposition to COVID-19 restrictions was related to greater anti-mask use attitudes. Younger age was associated with higher anti-mask use attitudes. Political ideology and gender became nonsignificant in Step 2.

Together these results suggest that psychological factors play a key role in both pro- and anti-mask use attitudes, over and above

⁵ All correlations were significant at a Bonferroni-corrected alpha level adjusted for the 5 correlates of pro- and anti-mask-use attitudes ($\alpha = 0.01$) except the correlation between age and gender.

demographic and political factors. However, Study 1 was limited by its focus on a small and narrow set of psychological factors, a limitation we remedy in Study 2.

6. Study 2

In Study 2, we examined a wider range of psychological factors expected to underlie mask use attitudes. In addition to fear of COVID-19 and reactance, we considered empathy, trust in healthcare professionals, and perceived norms. As outlined earlier, these psychological factors have been found to influence health-relevant attitudes and behaviors, and we suspect they are important to attitudes regarding mask use. Moreover, instead of using resentment of COVID-19 restrictions as a narrow indicator of reactance, we measured reactance using a combination of general trait-level and mask-specific reactance items to assess the construct more fully. We preregistered this study on OSF (https://osf.io/bf3g6/?view_only=d76e1920c7a243d3abe999dc8fa8b1af).

6.1. Method

6.1.1. Participants

We recruited 462 participants from MTurk. We excluded participants who failed at least one of three simple attention checks (e.g., “Select ‘Strongly agree’ for this item.”), leaving a sample of 372 (44.3% female; 74.7% White; 28.0% liberal, 18.4% moderate, 53.6% conservative). Sensitivity analyses using G*Power indicated that the smallest effect size we could detect given our sample size, model, and 80% power is $r = 0.13$.

6.1.2. Materials and procedure

See Table 3 for internal consistency statistics. Participants then evaluated one masked and one unmasked male target on the same dimensions as in Study 1.⁶ We computed measures of positive and negative target evaluations using the same approach as in Study 1. We again observed high correlations between positive mask and negative no mask evaluations ($r = 0.49$) and negative mask and positive no-mask evaluations ($r = 0.75$), so we combined these to create measures of pro-mask and anti-mask use attitudes. The pro-mask and anti-mask use attitudes were even more weakly related to each other in this study ($r = -0.09$), and so we continued to examine them separately.

Participants then completed the same measure of fear of COVID-19 as in Study 1. To assess perceived norms, participants reported the extent to which their family, friends, people similar to them, and people

⁶ Participants first completed the mask-no mask IAT. See supplemental materials for results.

Table 2
Regression analyses for study 1 dependent variables.

	Pro-mask use attitudes				Anti-mask use attitudes			
	<i>b</i> (<i>SE</i>)	<i>p</i>	CI _{95%}	<i>sr</i>	<i>b</i> (<i>SE</i>)	<i>p</i>	CI _{95%}	<i>sr</i>
Step 1								
Political ideology	-0.03(0.06)	0.637	-0.15, 0.09	-0.04	0.20(0.06)	<0.001	0.09, 0.30	0.25
Age	-0.01(0.01)	0.320	-0.03, 0.01	-0.08	-0.04(0.01)	<0.001	-0.06, -0.02	-0.34
Gender	0.13(0.22)	0.542	-0.29, 0.56	0.05	-0.40(0.20)	0.042	-0.80, -0.02	-0.14
Step 2								
Political ideology	0.16(0.06)	0.008	0.04, 0.27	0.17	-0.02(0.05)	0.677	-0.13, 0.09	-0.03
Age	-0.01(0.01)	0.169	-0.03, 0.004	-0.09	-0.03(0.01)	<0.001	-0.04, -0.02	-0.25
Gender	-0.10(0.18)	0.556	-0.46, 0.25	-0.04	-0.27(0.17)	0.118	-0.60, 0.07	-0.09
Fear of COVID-19	0.55(0.08)	<0.001	0.39, 0.71	0.43	0.05(0.08)	0.485	-0.10, 0.20	0.04
Opposed to COVID-19 restrictions	-0.17(0.07)	0.012	-0.30, -0.04	-0.16	0.48(0.06)	<0.001	0.35, 0.60	0.45

Bolded values are statistically significant.

Table 3
Correlations and descriptive statistics for study 2 variables.

	1	2	3	4	5	6	7	8	9	10
1. Pro-mask use attitudes	-									
2. Anti-mask use attitudes	-0.09 [†]	-								
3. Reactance	-0.09 [†]	0.74***	-							
4. Perceived norms	0.38***	-0.20***	-0.14**	-						
5. Trust in healthcare	0.45***	-0.16**	-0.11*	0.42***	-					
6. Empathy	0.35***	-0.38***	-0.40***	0.24***	0.26***	-				
7. Fear COVID-19	0.46***	-0.14**	-0.01	0.35***	0.43***	0.29***	-			
8. Political ideology	-0.06	0.58***	0.58***	-0.15**	-0.14**	-0.22***	-0.14**	-		
9. Age	0.04	-0.34***	-0.30***	0.05	-0.02	0.18**	-0.07	-0.10 [†]	-	
10. Gender	0.05	-0.07	-0.04	0.03	0.01	0.19***	0.03	-0.07	0.01	-
<i>M</i>	5.06	3.44	4.36	4.03	5.54	4.85	5.41	4.45	3.56	1.44
<i>SD</i>	1.14	1.65	1.53	0.69	1.22	0.94	1.30	1.81	11.57	0.50
α	0.91	0.96	0.95	0.77	-	0.74	0.91	-	-	-

*** $p < .001$.

** $p < .01$.

* $p < .05$.

[†] $p < .10$.

in their community wore masks in public on 1 (*Never*) to 5 (*Always*) scales. We averaged these to form a measure of perceived normativity of mask wearing. Participants next completed a shortened 7-item version of the Hong Psychological Reactance Scale (e.g., “I find contradicting others stimulating.”; Hong & Faedda, 1996), as well as a 4-item mask-specific reactance scale we adapted from Dillard and Shen’s (2005) freedom threat reactance scale (e.g., “Policies requiring people to wear a mask are trying to pressure me.”). These measures were highly correlated ($r = 0.70$), and we combined them to create a scale of overall reactance. Participants also reported the extent to which they trusted several sources, including scientific research and medical professionals, on 1 (*Distrust a great deal*) to 7 (*Trust a great deal*) scales. We averaged the latter two sources to create a measure of trust in healthcare professionals. They also completed a shortened 7-item version of the empathic concern subscale of Davis’s (1980) empathy scale (e.g., “Usually I am very concerned when I see someone else in distress.”) on 1 (*Strongly disagree*) to 7 (*Strongly agree*) scales. Participants also reported the same demographic information as in Study 1, including political ideology, age, and gender. All participants identified as male or female in this sample, so no participants were excluded to create a dichotomous gender variable.

6.2. Results and discussion

6.2.1. Correlational analyses

See Table 3 for correlations and descriptive statistics. Pro- and anti-mask use attitudes were not significantly correlated with one another.

Perceived norms, trust in healthcare, empathy, and fear of COVID-19 were correlated with greater pro-mask attitudes. Psychological reactance, political ideology, age, and gender were uncorrelated with pro-mask attitudes. Psychological reactance and political conservatism correlated with greater anti-mask attitudes, whereas perceived norms, trust in healthcare professionals, empathy, fear of COVID-19, and age were correlated with lower anti-mask attitudes. Gender was uncorrelated with anti-mask attitudes.⁷ Most psychological factors were modestly correlated with one another, although there was a relatively strong correlation between political ideology and reactance.

6.2.2. Regression analyses

To examine whether psychological variables accounted for unique variance in mask use attitudes above and beyond political ideology, age, and gender,⁸ we conducted hierarchical regression analyses in which we predicted pro-mask use attitudes and anti-mask use attitudes from political ideology, age, and gender in Step 1 and reactance, perceived

⁷ All correlations were significant at a Bonferroni-corrected alpha level adjusted for the 8 correlates of pro- and anti-mask-use attitudes ($\alpha = 0.006$) except for the correlation between fear of COVID-19 and anti-mask-use attitudes, which was just above the corrected level.

⁸ We did not include gender in our proposed analyses for the preregistration. Given recent evidence that men are more opposed to mask use than women (e.g., Capraro & Barcelo, 2020; Galasso et al., 2020), we thought it an important demographic variable to include. Results remained unchanged in the preregistered model that did not include gender.

norms, trust in healthcare professionals, empathy, and fear of COVID-19 in Step 2. See Table 4 for results of regression analyses.

Political ideology, age, and gender were unrelated to pro-mask use attitudes in Step 1. Psychological variables accounted for significant variance in pro-mask use attitudes above and beyond political ideology, age, and gender ($\Delta R^2 = 0.35$, $\Delta F(5, 351) = 38.11$, $p < .001$). In Step 2, perceived norms, trust in healthcare professionals, fear of COVID-19, and empathy were all related to greater pro-mask use attitudes. Reactance was unrelated to pro-mask use attitudes. Political ideology, age, and gender remained nonsignificant in Step 2.

Conservative political ideology and younger age were related to greater anti-mask use attitudes in Step 1, whereas gender was unrelated to anti-mask use attitudes. Psychological variables accounted for significant variance in anti-mask use attitudes above and beyond political ideology, age, and gender ($\Delta R^2 = 0.21$, $\Delta F(5, 351) = 38.97$, $p < .001$). In Step 2, higher reactance, conservative political ideology, and younger age were related to significantly greater anti-mask use attitudes, and empathy was related to somewhat lower anti-mask use attitudes, although this trend did not reach traditional levels of significance. Perceived norms, trust in healthcare professionals, and fear of COVID-19 were unrelated to anti-mask use attitudes. Gender remained nonsignificant in Step 2.

Study 2 largely replicated and extended the findings from Study 1. Findings suggest that pro-mask use attitudes are associated with trust in healthcare professionals, empathy for others, fear of COVID-19, and perceptions that mask-wearing is normative. In contrast, anti-mask use attitudes were associated with being politically conservative, younger, and having high levels of reactance.

7. General discussion

Over and above key demographic factors, psychological factors play an important role in attitudes regarding mask use. Individual differences in a number of psychological constructs were robustly associated with pro- and anti-mask use attitudes. Reactance was associated with anti-mask use attitudes. In contrast, fear of COVID-19, empathy, perceived norms pertaining to wearing masks, and trust in healthcare professionals were all associated with pro-mask use attitudes.

Notably, all predictors emerged over and above any effects of demographic predictors (age, political orientation, and gender). However, demographics did play a role in anti-mask use attitudes. Our findings suggest that positive attitudes regarding mask use do not differ by age, political ideology, or gender, but conservatives and younger people have more negative attitudes regarding mask use than liberals and older people, respectively. Thus, mask-use supporters appear to represent a variety of demographic backgrounds, but mask-use opponents tend to be younger and politically conservative. In Study 1 (but not Study 2), men had greater anti-mask evaluations than did women. This inconsistency could reflect Type I error (in Study 1) or an effect of small magnitude that we were not powered to detect reliably.

Evidence for demographic predictors supports polling data indicating that political ideology and age play a role in mask use attitudes. However, whereas Pew polls indicate that liberals are more likely to support mask use (Doherty et al., 2020), our findings suggest that political ideology is unrelated to pro-mask use attitudes. However, political conservatives are more likely to oppose mask use, which could be a result of messaging from political elites such as former President Trump focusing on opposition to preventive health measures, such as downplaying the need for masks (Yamey & Gonsalves, 2020). Our assessment of mask use attitudes (evaluations of others wearing or not wearing masks) differs from the Pew poll assessment, which asked people about their attitudes regarding mask use generally. Thus, methodological differences could account for the different findings. Similarly, past research indicates that age is associated with greater perceived vulnerability and higher engagement in preventive health behaviors (Calasanti et al., 2013; Wickman et al., 2008). In our data, younger age was

associated with greater anti-mask use attitudes (as opposed to older age being associated with greater pro-mask use attitudes). This suggests that younger people are more likely to oppose mask use, but age is not a factor in supporting mask use even at the bivariate level. This finding could reflect the likelihood that younger people are less vulnerable to severe cases of COVID-19 and thus, among that group, there may be fewer costs to opposing mask use.

With regard to psychological factors, we built on past work considering individual differences in mask use attitudes (Mahalik et al., 2021; Shah et al., 2020) by simultaneously examining various psychological factors' associations toward pro- and anti-mask use attitudes controlling for demographic factors. In our studies, reactance was associated with attitudes against the use of masks. This fits with evidence that reactance is associated with resistance to following orders generally and adopting recommended health measures specifically (Dillard & Shen, 2005; Hall et al., 2016). This pattern is sensible, given that mask use is being strongly encouraged and, in some cases, mandated, which could make people high in reactance oppose mask use.

In contrast, fear, trust in healthcare professionals, perceived norms, and empathy were associated with attitudes supportive of mask use. Although existing work demonstrated that empathy, trust in science, and fear of COVID-19 relate to more negative attitudes toward mask use, our studies demonstrate that these three factors relate to more positive pro-mask use attitudes rather than more negative anti-mask attitudes.

People with greater fear of COVID-19 were more supportive of mask use, in line with evidence that fear promotes engagement in preventive health behaviors (Maddux & Rogers, 1983). However, lower fear does not appear to be associated with heightened opposition to mask use. Thus, in the context of mask-use, fear appears to foster a motivation to approach preventive behaviors rather than avoid risky behaviors, which is in line with theories proposing that fear motivates safety-seeking behaviors (Panksepp, 2013).

People who trusted healthcare professionals also had greater pro-mask use attitudes. Trust in healthcare professionals is important for having people believe and follow the information such sources provide (Clayman et al., 2010; Nisbet et al., 2015), which corroborates the present findings that trust is central to pro-, but not anti-, mask attitudes.

Moreover, people who perceived mask wearing to be normative among similar and close others were also more supportive of mask use. Although recent research suggests manipulating perceived norms is not an effective way to change COVID-related behaviors (Bilancini et al., 2020), our findings fit with research suggesting that attitudes and behaviors typically follow perceived norms (Rimal & Real, 2005; Terry & Hogg, 1996).

Lastly, people high in empathy were more likely to have pro-mask use attitudes, consistent with evidence that empathy is related to greater concern for others, generally, and engagement in health behaviors aimed at avoiding infectious disease, specifically (Eisenberg & Miller, 1987; King et al., 2016; Pfattheicher et al., 2020). Of note, low levels of empathy do not relate to anti-mask use attitudes (i.e., people who oppose masks are not less empathetic); rather, low empathy is associated with less pro-mask use attitudes. Thus, mask opposition does not appear to stem from a lack of concern for others, but rather more self-focused factors such as resenting being told how to behave.

In identifying psychological factors underlying attitudes toward mask use, these findings have implications for understanding factors that contribute to people's decisions about whether or not to wear masks. Amidst a pandemic, it is crucial that people follow guidelines on preventing the spread of the virus. Understanding opposition to these guidelines is important for devising ways to increase compliance. For example, reactance emerged as a consistent predictor of anti-mask use attitudes. Consequently, persuasive appeals should attempt to make decisions to wear masks (or engage in other health-protective behaviors) feel like a matter of personal choice, rather than a directive mandated by the government. As another example, empathy emerged as a correlate of pro-mask use attitudes. Persuasive appeals, in turn, might benefit from

Table 4
Regression analyses for study 2 dependent variables.

	Pro-mask use attitudes				Anti-mask use attitudes			
	<i>b</i> (<i>SE</i>)	<i>p</i>	95% CI	<i>sr</i>	<i>b</i> (<i>SE</i>)	<i>p</i>	95% CI	<i>sr</i>
Step 1								
Political ideology	−0.03(0.03)	0.310	−0.10, 0.03	−0.05	0.51(0.04)	<0.001	0.43, 0.58	0.55
Age	0.01(0.01)	0.358	−0.01, 0.02	0.05	−0.04(0.01)	<0.001	−0.05, −0.03	−0.29
Gender	0.07(0.03)	0.570	−0.17, 0.31	0.03	−0.08(0.13)	0.570	−0.34, 0.19	−0.02
Step 2								
Political ideology	0.05(0.03)	0.162	−0.02, 0.11	0.06	0.21(0.04)	<0.001	0.14, 0.28	0.18
Age	0.004(0.01)	0.404	−0.01, 0.01	0.04	−0.02(0.01)	<0.001	−0.03, −0.01	−0.14
Gender	−0.001(0.10)	0.989	−0.20, 0.20	−0.001	−0.05(0.11)	0.673	−0.26, 0.17	−0.01
Fear COVID-19	0.27(0.05)	<0.001	0.18, 0.36	0.25	−0.09(0.05)	0.084	−0.19, 0.01	−0.06
Reactance	0.003(0.04)	0.943	−0.08, 0.09	0.003	0.59(0.05)	<0.001	0.49, 0.68	0.40
Perceived norms	0.21(0.08)	0.012	0.05, 0.37	0.11	−0.09(0.09)	0.305	−0.27, 0.08	−0.03
Trust in healthcare	0.22(0.05)	<0.001	0.13, 0.32	0.20	−0.01(0.05)	0.791	−0.12, 0.09	−0.01
Empathy	0.22(0.06)	<0.001	0.10, 0.34	0.15	−0.07(0.07)	0.309	−0.20, 0.07	−0.03

Bolded values are statistically significant.

highlighting the benefits of wearing masks to other people, over and above any benefits to one's own health. Similarly, because norms play a strong role in guiding people's decisions, advertisements that underscore the normativity of mask-wearing could be highly effective.

8. Limitations and future directions

Limitations of the present work provide valuable avenues for future research. For example, our samples are not necessarily representative of the entire U.S. population. Although we used online samples to increase demographic diversity, we cannot be certain every demographic was evenly represented. Future research should examine the constructs we assessed in nationally representative datasets and in contexts other than the U.S. In addition, our findings are correlational, and as such it is unclear whether demographic and psychological factors influence mask use attitudes or vice versa. However, given the novelty of mask use in U.S. culture, it seems more likely that both demographic and psychological factors preceded, and as a result, influenced, mask use attitudes. Nevertheless, future work could experimentally manipulate factors such as fear and perceived norms to confirm the directionality of our findings. Finally, we assessed several psychological constructs we theorized would be important to mask use attitudes, but there are likely additional factors that contribute to these attitudes. For example, exposure to misinformation might contribute to anti-mask use attitudes. Future research should examine additional demographic and psychological factors related to attitudes regarding mask use.

9. Conclusion

Taken together, our findings suggest that although demographic characteristics are associated with attitudes toward mask use, psychological factors play an important role. Above and beyond political ideology and age, reactance was associated with anti-mask use attitudes, whereas fear, trust of healthcare professionals, empathy, and perceived normativity were associated with pro-mask use attitudes. By understanding the nature and correlates of mask use attitudes, we will be better equipped to devise measures promoting mask use to quell the spread of COVID-19. More broadly, this research provides valuable information about psychological factors that may underlie the way people think about a range of preventative health behaviors.

CRediT authorship contribution statement

Stephanie R. Mallinas: Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing. **Jon K. Maner:** Conceptualization, Methodology, Writing – review & editing. **E. Ashby Plant:** Conceptualization, Methodology, Writing – review &

editing.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T).
- Bilancini, E., Boncinelli, L., Capraro, V., Celadini, T., & Di Paolo, R. (2020). *The effect of norm-based messages on reading and understanding COVID-19 pandemic response governmental rules* [Preprint]. PsyArXiv. <https://doi.org/10.31234/osf.io/7863g>.
- Brehm, J. W. (1966). *A theory of psychological reactance* (pp. x, 135). Academic Press.
- Brehm, S. S., & Brehm, J. W. (2013). *Psychological reactance: A theory of freedom and control*. Academic Press.
- Brewer, M. B. (1999). The psychology of prejudice: Ingroup love and outgroup hate? *Journal of Social Issues*, 55(3), 429–444. <https://doi.org/10.1111/0022-4537.00126>.
- Calasanti, T., Pietilä, L., Ojala, H., & King, N. (2013). Men, bodily control, and health behaviors: The importance of age. *Health Psychology*, 32(1), 15. <https://doi.org/10.1037/a0029300>.
- Capraro, V., & Barcelo, H. (2020). *The effect of messaging and gender on intentions to wear a face covering to slow down COVID-19 transmission* [Preprint]. PsyArXiv. <https://doi.org/10.31234/osf.io/tg7vz>.
- CDC. (2020a). *Considerations for wearing masks*. Centers for Disease Control and Prevention. February 11 <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover-guidance.html>.
- CDC. (2020b). *Older adults*. Centers for Disease Control and Prevention. February 11 <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/older-adults.html>.
- Clayman, M. L., Manganello, J. A., Viswanath, K., Hesse, B. W., & Arora, N. K. (2010). Providing health messages to Hispanics/Latinos: Understanding the importance of language, trust in health information sources, and media use. *Journal of Health Communication*, 15(sup3), 252–263. <https://doi.org/10.1080/10810730.2010.522697>.
- Davis, M. (1980). A multidimensional approach to individual differences in empathy. *JSAS Catalog Sel. Doc. Psychol.*, 10.
- De Houwer, J. (2002). The implicit association test as a tool for studying dysfunctional associations in psychopathology: Strengths and limitations. *Journal of Behavior Therapy and Experimental Psychiatry*, 33(2), 115–133. [https://doi.org/10.1016/S0005-7916\(02\)00024-1](https://doi.org/10.1016/S0005-7916(02)00024-1).
- Díaz, A., Beleña, Á., & Zueco, J. (2020). The role of age and gender in perceived vulnerability to infectious diseases. *International journal of environmental research and public health*, 17(2), 485.
- Dillard, J. P., & Shen, L. (2005). On the nature of reactance and its role in persuasive health communication. *Communication Monographs*, 72(2), 144–168. <https://doi.org/10.1080/03637750500111815>.
- Doherty, C., Kiley, J., & Asheer, N. (2020). Republicans, democrats move even further apart in coronavirus concerns | pew research center. <https://www.pewresearch.org/politics/2020/06/25/republicans-democrats-move-even-further-apart-in-coronavirus-concerns/>.
- Eisenberg, N., Eggum, N. D., & Giunta, L. D. (2010). Empathy-related responding: Associations with prosocial behavior, aggression, and intergroup relations. *Social Issues and Policy Review*, 4(1), 143–180. <https://doi.org/10.1111/j.1751-2409.2010.01020.x>.
- Eisenberg, N., & Miller, P. A. (1987). The relation of empathy to prosocial and related behaviors. *Psychological Bulletin*, 101(1), 91–119. <https://doi.org/10.1037/0033-2909.101.1.91>.
- Erceg-Hurn, D. M., & Steed, L. G. (2011). Does exposure to cigarette health warnings elicit psychological reactance in smokers? *Journal of Applied Social Psychology*, 41(1), 219–237. <https://doi.org/10.1111/j.1559-1816.2010.00710.x>.
- Finlay, K. A., Trafimow, D., & Moroi, E. (1999). The importance of subjective norms on intentions to perform health behaviors. *Journal of Applied Social Psychology*, 29(11), 2381–2393. <https://doi.org/10.1111/j.1559-1816.1999.tb00116.x>.

- Galasso, V., Pons, V., Profeta, P., Becher, M., Brouard, S., & Foucault, M. (2020). Gender differences in COVID-19 attitudes and behavior: Panel evidence from eight countries. *Proceedings of the National Academy of Sciences*, 117(44), 27285–27291. <https://doi.org/10.1073/pnas.2012520117>.
- Gollwitzer, A., Martel, C., Brady, W. J., Pärnamets, P., Freedman, I. G., Knowles, E. D., & Van Bavel, J. J. (2020). Partisan differences in physical distancing are linked to health outcomes during the COVID-19 pandemic. *Nature Human Behaviour*, 4(11), 1186–1197. <https://doi.org/10.1038/s41562-020-00977-7>.
- Governor's Press Office. (2020). Governor Cuomo launches new PSA as latest in series of "Mask Up, America" Campaign. Governor Andrew M. Cuomo, August 10 <https://www.governor.ny.gov/news/governor-cuomo-launches-new-psa-latest-series-mask-america-campaign>.
- Hall, M. G., Sheeran, P., Noar, S. M., Ribisl, K. M., Bach, L. E., & Brewer, N. T. (2016). Reactance to Health Warnings Scale: Development and validation. *Annals of Behavioral Medicine*, 50(5), 736–750. <https://doi.org/10.1007/s12160-016-9799-3>.
- Hong, S.-M., & Faedda, S. (1996). Refinement of the Hong psychological reactance scale. *Educational and Psychological Measurement*, 56(1), 173–182. <https://doi.org/10.1177/0013164496056001014>.
- Hout, M. (1999). Abortion politics in the United States, 1972–1994: From single issue to ideology. *Gender Issues*, 17(2), 3–34. <https://doi.org/10.1007/s12147-999-0013-9>.
- Karpinski, A., & Steinman, R. B. (2006). The single category implicit association test as a measure of implicit social cognition. *Journal of Personality and Social Psychology*, 91(1), 16. <https://doi.org/10.1037/0022-3514.91.1.16>.
- King, D. B., Kamble, S., & DeLongis, A. (2016). Coping with influenza A/H1N1 in India: Empathy is associated with increased vaccination and health precautions. *International Journal of Health Promotion and Education*, 54(6), 283–294. <https://doi.org/10.1080/14635240.2016.1174950>.
- Liang, W., Shediac-Rizkallah, M. C., Celentano, D. D., & Rohde, C. (1999). A population-based study of age and gender differences in patterns of health-related behaviors. *American journal of preventive medicine*, 17(1), 8–17.
- MacInnis, C. C., MacLean, M. H., & Hodson, G. (2014). Does "humanization" of the unborn explain why conservatives (vs. Liberals) oppose abortion? *Personality and Individual Differences*, 59, 77–82. <https://doi.org/10.1016/j.paid.2013.11.009>.
- Maddux, J. E., & Rogers, R. W. (1983). Protection motivation and self-efficacy: A revised theory of fear appeals and attitude change. *Journal of Experimental Social Psychology*, 19(5), 469–479. [https://doi.org/10.1016/0022-1031\(83\)90023-9](https://doi.org/10.1016/0022-1031(83)90023-9).
- Mahalik, J. R., Bianca, M. D., & Harris, M. P. (2021). Men's attitudes toward mask-wearing during COVID-19: Understanding the complexities of mask-utility. *Journal of Health Psychology*, Article 1359105321990793. <https://doi.org/10.1177/1359105321990793>.
- Makhanova, A., & Shepherd, M. A. (2020). Behavioral immune system linked to responses to the threat of COVID-19. *Personality and Individual Differences*, 167, Article 110221. <https://doi.org/10.1016/j.paid.2020.110221>.
- Makridakis, C., & Rothwell, J. T. (2020). *The real cost of political polarization: Evidence from the COVID-19 pandemic (SSRN scholarly paper ID 3638373)*. Social Science Research Network. <https://papers.ssrn.com/abstract=3638373>.
- Meredith, L. S., Eisenman, D. P., Rhodes, H., Ryan, G., & Long, A. (2007). Trust influences response to public health messages during a bioterrorist event. *Journal of Health Communication*, 12(3), 217–232. <https://doi.org/10.1080/10810730701265978>.
- Miller, C. H., Lane, L. T., Deatrick, L. M., Young, A. M., & Potts, K. A. (2007). Psychological reactance and promotional health messages: The effects of controlling language, lexical concreteness, and the restoration of freedom. *Human Communication Research*, 33(2), 219–240. <https://doi.org/10.1111/j.1468-2958.2007.00297.x>.
- Musa, D., Schulz, R., Harris, R., Silverman, M., & Thomas, S. B. (2009). Trust in the health care system and the use of preventive health services by older Black and White adults. *American Journal of Public Health*, 99(7), 1293–1299. <https://doi.org/10.2105/AJPH.2007.123927>.
- Nisbet, E. C., Cooper, K. E., & Garrett, R. K. (2015). The partisan brain: How dissonant science messages lead conservatives and liberals to (dis)trust science. *The Annals of the American Academy of Political and Social Science*, 658(1), 36–66. <https://doi.org/10.1177/0002716214555474>.
- Palmer, C. L., & Peterson, R. D. (2020). Toxic mask-utility: The link between masculine toughness and affective reactions to mask wearing in the COVID-19 era. *Politics & Gender*, 16(4), 1044–1051. <https://doi.org/10.1017/S1743923X20000422>.
- Panksepp, J. (2013). Cross-species neuroaffective parsing of primal emotional desires and aversions in mammals. *Emotion Review*, 5(3), 235–240. <https://doi.org/10.1177/1754073913477515>.
- Pender, N. J., & Pender, A. R. (1985). *Attitudes, subjective norms, and intentions to engage in health behaviors*. Abstract—Europe PMC. <https://europepmc.org/article/med/3632840>.
- Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In R. E. Petty, & J. T. Cacioppo (Eds.), *Communication and persuasion: Central and peripheral routes to attitude change* (pp. 1–24). Springer. https://doi.org/10.1007/978-1-4612-4964-1_1.
- Pfattheicher, S., Nockur, L., Böhm, R., Sassenrath, C., & Petersen, M. B. (2020). The emotional path to action: Empathy promotes physical distancing and wearing of face masks during the COVID-19 pandemic. *Psychological Science*, 31(11), 1363–1373. <https://doi.org/10.1177/0956797620964422>.
- Railsback, C. C. (1982). PRO-life, PRO-choice: Different conceptions of value. *Women's Studies in Communication*, 5(1), 16–28. <https://doi.org/10.1080/07491409.1982.11089638>.
- Rimal, R. N., & Real, K. (2005). How behaviors are influenced by perceived norms: A test of the theory of normative social behavior. *Communication Research*, 32(3), 389–414. <https://doi.org/10.1177/0093650205275385>.
- Shah, N., Kalwar, M. S., & Soomro, B. A. (2020). Early COVID-19 outbreak, individuals' mask attitudes and purchase intentions: A cohesive care. *Journal of Science and Technology Policy Management*. <https://doi.org/10.1108/JSTPM-05-2020-0082> (ahead-of-print(ahead-of-print)).
- Sheeran, P., Maki, A., Montanaro, E., Avishai-Yitshak, A., Bryan, A., Klein, W. M. P., Miles, E., & Rothman, A. J. (2016). The impact of changing attitudes, norms, and self-efficacy on health-related intentions and behavior: A meta-analysis. *Health Psychology*, 35(11), 1178. <https://doi.org/10.1037/hea0000387>.
- Smith-McLallen, A., & Fishbein, M. (2008). Predictors of intentions to perform six cancer-related behaviours: Roles for injunctive and descriptive norms. *Psychology, Health & Medicine*, 13(4), 389–401. <https://doi.org/10.1080/13548500701842933>.
- Tappolet, C. (2009). *Emotion, motivation, and action: The case of fear*. Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199235018.003.0015>.
- Terry, D. J., & Hogg, M. A. (1996). Group norms and the attitude-behavior relationship: A role for group identification. *Personality and Social Psychology Bulletin*, 22(8), 776–793. <https://doi.org/10.1177/0146167296228002>.
- Thompson, J. E., & Pleck, J. H. (1986). The structure of male role norms. *American Behavioral Scientist*, 29(5), 531–543. <https://doi.org/10.1177/000276486029005003>.
- Vaidya, V., Partha, G., & Karmakar, M. (2012). Gender differences in utilization of preventive care services in the United States. *Journal of Women's Health*, 21(2), 140–145. <https://doi.org/10.1089/jwh.2011.2876>.
- Van Bavel, J. J., Baicker, K., Boggio, P. S., Capraro, V., Cichocka, A., Cikara, M., Crockett, M. J., Crum, A. J., Douglas, K. M., Druckman, J. N., Drury, J., Dube, O., Ellemers, N., Finkel, E. J., Fowler, J. H., Gelfand, M., Han, S., Haslam, S. A., Jetten, J., ... Willer, R. (2020). Using social and behavioural science to support COVID-19 pandemic response. *Nature Human Behaviour*, 4(5), 460–471. <https://doi.org/10.1038/s41562-020-0884-z>.
- Van Bavel, J. J., Cichocka, A., Capraro, V., Sjästad, H., Nezelek, J. B., Alfano, M., Azevedo, F., Cislak, A., Lockwood, P., Ross, R. M., Agadullina, E., Apps, M. A. J., Aruta, J. B. R., Bor, A., Crabtree, C., Cunningham, W. A., De, K., Elbaek, C. T., Ejaz, W., & Palomäki, J. (2020). *National identity predicts public health support during a global pandemic: Results from 67 nations*. PsyArXiv. <https://doi.org/10.31234/osf.io/ydt95>.
- Wagerman, S. A., Bedikian, A., & Ross, B. S. (2021). Psychodynamic and sociopolitical predictors of COVID distress and gravity. *Personality and Individual Differences*, 171, Article 110506. <https://doi.org/10.1016/j.paid.2020.110506>.
- White, K. M., Terry, D. J., & Hogg, M. A. (1994). Safer sex behavior: The role of attitudes, norms, and control factors. *Journal of Applied Social Psychology*, 24(24), 2164–2192. <https://doi.org/10.1111/j.1559-1816.1994.tb02378.x>.
- Wickman, M. E., Anderson, N. L. R., & Smith Greenberg, C. (2008). The adolescent perception of invincibility and its influence on teen acceptance of health promotion strategies. *Journal of Pediatric Nursing*, 23(6), 460–468. <https://doi.org/10.1016/j.pedn.2008.02.003>.
- Wilson, E. J., & Sherrell, D. L. (1993). Source effects in communication and persuasion research: A meta-analysis of effect size. *Journal of the Academy of Marketing Science*, 21(2), 101–112. <https://doi.org/10.1007/BF02894421>.
- Witte, K., & Allen, M. (2000). A meta-analysis of fear appeals: Implications for effective public health campaigns. *Health Education & Behavior*, 27(5), 591–615. <https://doi.org/10.1177/109019810002700506>.
- Yamey, G., & Gonsalves, G. (2020). Donald Trump: A political determinant of covid-19. *BMJ*, m1643. <https://doi.org/10.1136/bmj.m1643>.