What predicts attitudes about mask wearing?
COVID-19 prevalence, younger age, left-leaning political
orientation, COVID-19-related stress, and Consideration of Future
Consequences predict positive attitudes about wearing face
masks

Calvin Isch¹, Diego Guevara Beltran², Jessica D. Ayers², Joe Alcock³, Lee Cronk⁴, Hector
Hurmuz-Sklis, Keith Tidball⁵, Andrew Van Horn⁴, Peter M. Todd^{1*} & Athena Aktipis^{2*}

¹Cognitive Science Program and Department of Psychological and Brain Sciences, Indiana
University Bloomington

²Department of Psychology, Arizona State University

³Department of Emergency Medicine, University of New Mexico

⁴Department of Anthropology, Rutgers University - New Brunswick

⁵Department of Natural Resources, Cornell University

This working paper has not yet been peer-reviewed

*These authors share senior authorship

Abstract

What explains differences in attitudes towards wearing protective face masks to limit the spread of the SARS-CoV-2 virus? We investigated potential drivers of attitudes about mask wearing as part of a longitudinal study during the COVID-19 pandemic ($N_{\text{participants}} = 711$, $N_{\text{countries}} = 36$), focusing on people's perceptions and feelings about seeing others in their local communities wearing masks. We found that both stress about COVID-19 and the local incidence rate of COVID-19 predicted these attitudes, but perceived risk of infection did not. We also found that older and politically right-leaning respondents tended to have more negative attitudes towards wearing masks, while those with more concern for future consequences have more positive attitudes. Individuals with a greater vulnerability to COVID-19 as well as those with increased disease-related stress reported inconsistent emotional reactions to seeing people wear masks in public. For example, older participants were likely to either strongly agree or strongly disagree that seeing others wear masks led to feelings of anxiety, and some individuals with high disease-related stress reported greater feelings of anxiety, whereas others reported increased feelings of safety, when seeing people wear masks in public. These findings highlight some of the demographic, psychological, and environmental factors that were associated with respondents' attitudes toward face masks and will be of use to health policy efforts aiming to increase mask wearing and other protective behaviors.

What predicts attitudes about mask wearing? COVID-19 prevalence, younger age, left-leaning political orientation, COVID-19-related stress, and consideration of future consequences predict positive attitudes about wearing face masks

Introduction

Organizations and governments around the world have recommended wearing surgical masks and cloth face coverings to prevent the spread of the SARS-CoV-2 virus (Centers for Disease Control and Prevention, 2020; Greenhalgh et al., 2020; Chu et al., 2020). Despite continued transmission of the disease, news reports indicate that there exists a great deal of heterogeneity in the use of face masks. Given that some individuals readily follow mask-wearing guidelines while others resist or reject this guidance, we sought to explore factors that are associated with mask-wearing attitudes. In our previous work (Guevara Beltran et al., 2020), we investigated the environmental, demographic, and psychological factors -- such as perceived risk of infection and stress -- that were associated with reporting mask wearing during in-person interactions. Because attitudes and intentions also contribute to differences in adherence to mask-wearing recommendations, here we investigated how the prevalence of COVID-19, demographic factors, and psychological factors influence mask-wearing attitudes. In a third manuscript (Guevara Beltran & Isch et al., in prep), we examined how these factors contribute to variation in mask-wearing behavior in routine, recreational, and occupational settings.

Local prevalence of COVID-19, perceived risk of infection, stress, and future orientation are associated with mask-wearing behavior

Previous work has found a number of factors that are associated with engaging in protective behaviors to avoid disease. Demographic characteristics such as age, sex, education, and political orientation were related to the adoption of protective behaviors during the H1N1 and COVID-19 pandemics (Bish & Michie, 2010; Capraro & Barcelo, 2020; Kachanoff et al., 2020; Qiu et al., 2020; Yıldırım & Güler, 2020). Perceived risk of infection and infectious disease-related stress were also associated with the adoption of disease-avoidance behaviors (Brewer et al., 2007; Eisenberger et al., 2017; Jørgensen et al., 2020; Schneiderman et al.,

2005; Yıldırım & Güler, 2020; Taylor et al., 2020; Hoedl, Eglseer, & Bauer, 2020). More broadly, Consideration of Future Consequences -- the degree to which individuals consider the immediate versus long-term consequences of their actions (Joireman et al., 2012; Strathman et al., 1994) -- was also associated with disease avoidance along with other healthy and prosocial behaviors (Appleby et al., 2005; Strathman et al., 1994; Joireman et al., 2006). In our first study (Guevara Beltran et al., 2020), we found that people reported wearing a mask during in-person interactions more frequently in areas with a greater SARS-CoV-2 virus prevalence, when they had more COVID-19-related stress or higher perceived risk of infection, and when they had more Consideration of Future Consequences (e.g., were more influenced by the long-term consequences of their behavior). To a lesser degree, we also found that women and individuals that are politically inclined to the left reported wearing masks more frequently.

Demographics and psychological traits predict attitudes; attitudes predict willingness to engage in protective behaviors

During the COVID-19 pandemic, a number of psychological and demographic characteristics have been found to influence people's attitudes toward disease-avoidance behaviors. Women tended to agree more than men with public policy measures that limit people's behavior in order to reduce disease transmission (Galasso et al., 2020). Individuals that tend to vote left of center politically and those who score higher in trait self control reported more positive attitudes towards mask mandates and beliefs about the efficacy of masks (Xu & Cheng, 2020). Age and education were also found to influence a variety of mask-wearing attitudes and intentions: Young people were more driven by judgements of others whereas older individuals were driven by protecting others from getting sick, and education was an important factor as well, with those having a university degree reporting greater intentions to wear a mask when in public (Rieger, 2020). Other psychological traits such as conscientiousness, agreeableness, and empathy showed similar associations with greater willingness to wear a mask and follow other government-recommended behaviors (Pfattheicher et al., 2020, Asselmann et al. 2020).

Attitudes and beliefs about the effectiveness of protective measures has been found to predict engagement with disease-avoidance behaviors. For example, people who believe that protective behaviors such as hand washing and social distancing will mitigate the spread of SARS-CoV-2 were more likely to engage in those behaviors (Clark et al., 2020); but curiously

this effect was strongest when people perceived their risk of infection to be low (Jørgensen et al., 2020). This suggests that people's beliefs and attitudes about protective behaviors might have complex and sometimes unexpected effects on their likelihood of engaging in these behaviors.

The present work

The current work built on our previous study (Guevara Beltran et al., 2020) in which we investigated the correlations between mask wearing and COVID-19 prevalence, perceived risk of infection, stress, demographics, and the Consideration of Future and Immediate Consequences scales. Here we explored how these same factors influence attitudes and intentions towards wearing face masks. First, we tested how these factors predict the extent to which people feel safe or anxious when they see others wearing masks in public. Next, we investigated how these factors contribute to respondents' intention to wear masks to protect themselves and others as well as beliefs about whether wearing a mask in public is the right thing to do. Finally, we tested whether these factors predicted the length of time people report that they are willing to wear a mask when in public. In this manuscript, we did not make moral claims about these attitudes, but rather sought to understand the attitudes that individuals have towards masks and what underlying factors may contribute to their stances. Based on previous research, we expected that COVID-19 prevalence, COVID-19-related stress, perceived risk of infection, and Consideration of Future Consequences would positively influence mask-wearing attitudes. We also expected older participants, women, and individuals who are politically inclined to the left to report more positive attitudes towards wearing masks.

Method

We recruited an international sample of participants ($N_{participants} = 711$, $N_{countries} = 36$) through Prolific Academic as part of an ongoing longitudinal study on COVID-19 and cooperation ([Ayers et al. 2020](#)). Participants provided demographic information including age ($M_{age} = 29.4$, $SD_{age} = 10.9$), sex (female = 344), education ($M = 4.1$, $SD = 1.6$, 1 = *Less than high school*, 4 = *2-year degree (associates)*, 8 = *Doctoral or professional degree*), political orientation with higher numbers being more right-leaning ($M = 3.5$, $SD = 1.3$, 1 = *extremely to the left*, 7 = *extremely to*

the right), and subjective socioeconomic status ($M = 5.6$, $SD = 1.5$, 1 = *Much worse off than others*, 10 = *Much better off than others* (Adler et al., 2000) on May 6. On June 13 and June 27, participants filled out the revised Consideration of Future Consequences scale (CFC, Joireman et al., 2012) with subscales for Consideration of Immediate ($M = 22.8$, $SD = 6.9$) and Consideration of Future ($M = 35.1$, $SD = 6.0$) Consequences, referred to here as "CFC-immediate consequences" and "CFC-future consequences" respectively. On June 27 participants also answered questions about their perceived risk of COVID-19 infection ($M = 3.5$, $SD = 1.5$, *How likely do you think it is that you will become infected with COVID19?*; 1 = *not at all*, 7 = *extremely*), their COVID-19-related stress ($M = 3.8$, $SD = 1.7$, *How stressed do you currently feel dealing with changes caused by COVID19?*; 1 = *not at all*, 7 = *extremely*), and six questions about their attitudes, beliefs, and intentions regarding mask wearing. These are referred to as 'attitudes' throughout the remainder of the paper. They include: 1) whether seeing other people in public wearing masks makes participants feel anxious, 2) whether seeing other people in public wearing masks makes participants feel safe, 3) whether participants wear masks to protect themselves, 4) whether they wear masks to protect others, 5) whether participants believe wearing a mask in public is the right thing to do, and 6) how long participants would be willing to wear masks. Participants responded to the first five questions on a Likert scale (1 = *Strongly disagree* to 7 = *Strongly agree*) and chose one of twelve options in response to the sixth question (*Not at all*, *Two weeks*, *One month*, *Two months*, *Four months*, *Six months*, *Nine months*, *1 year*, *1.5 years*, *2 years*, *More than 2 years*, *Forever*).

On May 6, respondents reported their current country of residence and postal code. We used these codes to link cumulative COVID-19 incidence rates ($M = 314.7$, $SD = 344.9$, i.e., confirmed cases per 100,000 individuals) to the location of our respondents on June 27, 2020 through the use of additional data from the COVID-19 Data Repository, which is maintained by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (Dong, Du, & Gardner., 2020). As a linking function we first converted each respondents location into longitude and latitude points and then matched these points to the location (again longitude and latitude) in the COVID-19 Data Repository that was the minimum euclidean distance away. Different countries maintain these data at different degrees of granularity, for example in the United States data is maintained at the county level (subregions within each state) whereas other countries keep data on a national level. We always selected the highest degree of specificity possible when that information was available. Eleven respondents provided postal

codes that were unidentifiable and were removed from analyses that required location information.

Overview of data analysis strategy

To explore how factors such as the local prevalence of COVID-19 and individual differences predict the six attitudes collected, we conducted ordered-probit regressions. Ordered-probit regression models have been found to describe Likert-style data well, ameliorating many issues that arise from treating such data as metric (Liddell & Kruschke, 2018). Ordinal data is not metric; while numerals indicate order, they do not indicate equal intervals between each item (i.e. on a scale from 1-5 with 3 = neutral, 4 = somewhat happy, and 5 = very happy, the increment in happiness from 3-4 may be very different from 4-5). Accounting for this, ordinal models split normally distributed latent continuous values for the variable into unequal-sized sub-intervals that fit the data, rather than splitting the data into equally intervalled subunits like metric models. Because ordinal data are frequently skewed, heavily tailed, or multi-modal they often violate assumptions of normality, so using metric models frequently results in type 1 errors, type 2 errors, and inversions of effects. The latent scale used in ordinal models adjusts for non-normal data and addresses the resulting issues that emerge from treating them as metric (See Liddell & Kruschke, 2018 for an extended discussion).

If the ordered probit regression assumptions are met, then the coefficients for predictor variables will stay the same (i.e. remain parallel) across each level of the regression (Williams, 2016). This means that if women are more likely to agree with a dependent variable ranging from 1 (strongly disagree) - 5 (strongly agree), we would expect a greater proportion (relative to the space covered in the latent continuous variable) of women to select 2 than 1, even more women choose in 3 than 2, and so on. This is known as the parallel lines or proportional odds assumption and it can be tested with the parallel line test. All but one of our ordered-probit regression models failed the parallel lines test, indicating that some predictors did not have equal effects across levels of the dependent variables (e.g., women may have been more likely to agree, but less likely to strongly agree with the dependent variable). To control for this, we conducted generalized linear regression models with probit link function and partial proportional odds using Stata's `gologit2` function (Williams, 2006). This approach allowed us to maintain the parallel lines assumption for some independent variables but also relax it when appropriate.

Variables that maintain the assumption of parallel lines are treated the same as in the ordered probit regression models. Variables that violate the assumption have different coefficients across the levels of the regression, and a more non-linear relationship is needed to describe these data (Williams, 2016). All coefficients are thus provided for these variables in the supplemental information. The parallel lines test frequently fails when there are many explanatory variables (Brant, 1990) or continuous predictors (O'Connell, 2006 p. 29), and it is run both on the entire regression and on each predictor variable individually. Because of the conservative nature of the test, we used $p < .01$ as significance testing for each predictor variable before relaxing the parallel lines assumption for that variable only.

Results

Frequency distributions for the six attitudes were provided in Figure 1. All regressions contained the following predictor variables: prevalence of COVID-19, perceived risk of COVID-19 infection, COVID-19-related stress, age, sex, education, subjective socioeconomic status, Consideration of Immediate Consequences, and Consideration of Future Consequences. All predictor variables were standardized, except for sex, which was treated as a categorical predictor. For variables that violated the parallel lines test, the overall p-value was based on a test of joint probability for all coefficients (i.e., one for each level of the dependent variable) of the partial proportional odds model. Summary results of every regression are presented in Table 1.

Figure 1. Stacked bars of the mask-wearing attitudes as raw scores collected on June 27, 2020. Time willing to wear masks was scored on a 12-point scale (*Not at all, Two weeks, One month, Two months, Four months, Six months, Nine months, 1 year, 1.5 years, 2 years, More than 2 years, Forever*). All others were scored on 7-point scales (1 = *Strongly disagree*, 7 = *Strongly agree*). The length of each colored bar segment represents the percentage of respondents who selected each point on the scale. An interactive online version of figure 1 is available here: <http://tabsoft.co/3rwfoW6>

People more stressed by COVID-19 and concerned with immediate consequences reported greater anxiety when seeing people wear face masks.

On average, respondents tended to disagree with the statement ($M = 2.8$, $SD = 2.0$), “*Seeing people in public wearing a face mask makes me feel anxious*”. As seen in Figure 2, stress, Consideration of Future Consequences, and Consideration of Immediate Consequences were all significant predictors that maintained the assumption of parallel lines (See Supplementary Tables 1 & 2 for detailed information on each beta estimate and Supplementary Figure 1 for heatmaps between each predictor and this attitude). People who reported greater stress about COVID-19 and people with greater Consideration of Immediate Consequences were more likely to feel anxiety when seeing others wear masks in public. Consideration of Future Consequences was a negative predictor of anxiety: The more respondents reported caring about the long-term consequences of their actions, the less they reported that seeing people wearing face masks in public induced anxiety. People who score high on Consideration of Future Consequences were more likely to engage in protective behaviors generally (e.g.,

sunscreen/condom usage), which may make them more amenable to new protective behaviors such as mask wearing. Age was a significant predictor that did not pass the test of parallel lines meaning that a nonlinear function better fits this relationship. Older people were more likely to have strong opinions - either strongly agreeing or strongly disagreeing that seeing people wearing masks in public makes them feel anxious.

Figure 2. The figure above shows the variables that were associated with participants' reports that "Seeing people in public wearing face masks makes me feel anxious." The effects on the dependent variable were standardized using beta estimates from a partial proportional odds model. Circles represent standardised beta estimates (β) and bars represent 95% confidence intervals. Each item was colored by significance where predictors significant at $p < .05$ (two sided) are represented by the darker shade of blue, and those over this significance level are a lighter shade. Variables that failed the parallel lines test have been excluded from this figure (see supplementary Table 2), leaving only the variables that are linear predictors of this attitude. CFC is the Consideration of Future Consequences scale, with two subscales. An interactive online version of figure 2 is available here: <http://tabsoft.co/3skld8h>

People who report more COVID-19 stress, younger, and more politically left-leaning individuals are more likely to report that seeing people in public wearing face masks makes them feel safe

Most respondents agreed with the statement "*Seeing people in public wearing face masks makes me feel safe.*" ($M = 5.0$, $SD = 2.1$). Respondents with higher COVID-19-related stress were more likely to agree with this statement than those with less COVID-19-related stress (Figure 3; see also Supplementary Tables 3 & 4 and Supplementary Figure 2). Political

orientation and age were also significant predictors: Younger and more politically left-leaning participants felt more safe when they saw people wearing masks. Finally, Consideration of Future Consequences failed the parallel lines test, meaning that the impacts of this variable cannot be described by a single linear coefficient; however, it does show overall significance across its coefficients (determined through a test of joint significance) indicating that it is an important non-linear predictor of this attitude. We found that individuals with higher Consideration of Future Consequences reported feeling safer when seeing masks in public but were less likely to indicate that they strongly agree with this statement.

Figure 3. The figure above shows the variables that were associated with participants' reports that "Seeing people in public wearing face masks makes me feel safe." The effects on the dependent variable were standardized using beta estimates from a partial proportional odds model. Circles represent standardised beta estimates (β) and bars represent 95% confidence intervals. Each item was colored by significance where predictors significant at $p < .05$ (two sided) are represented by the darker shade of blue, and those over this significance level are a lighter shade. Variables that failed the parallel lines test have been excluded from this figure (see supplementary Table 4), leaving only the variables that are linear predictors of this attitude. CFC is the Consideration of Future Consequences scale, with two subscales. An interactive online version of this figure can be found here: <http://tabsoft.co/3skld8h>

People were more likely to report wearing a mask to protect themselves if they reported higher COVID-19 stress, higher SES, younger age, concern for future consequences and were from area with higher COVID-19 prevalence

Overall, participants reported moderate agreement with the statement, "*I wear a face mask*

when going out in public to keep myself from getting sick” ($M = 4.6$, $SD = 2.2$). Five independent variables positively predicted this attitude (Figure 4; see also Supplementary Tables 5 & 6 and Supplementary Figure 3). Individuals who lived in areas with higher local prevalence of COVID-19 were more likely to report wearing a mask to protect themselves. Likewise, higher COVID-19-related stress, and subjective SES were associated with higher agreement with this statement. Age and Consideration of Future Consequences were both statistically significant predictors that failed to pass the test of parallel lines, meaning that they are significant non-linear predictors of this attitude. Older individuals were more likely to disagree with this attitude, and younger people were more likely to report moderate agreement. While individuals high in Consideration of Future Consequences were likely to report moderate agreement (i.e., 5 or 6 on the scale), they were less likely to strongly agree that they wore a mask to protect themselves (i.e., less likely to indicate a 7 on the scale).

Figure 4. The figure above shows the variables that were associated with participants' agreement with the statement “I wear a face mask when going out in public to keep myself from getting sick.” The effects on the dependent variable were standardized using beta estimates from a partial proportional odds model. Circles represent standardised beta estimates (β) and bars represent 95% confidence intervals. Each item was colored by significance where predictors significant at $p < .05$ (two sided) are represented by the darker shade of blue, and those that are not significant below this level are a lighter shade. Variables that failed the parallel lines test have been excluded from this figure (see supplementary Table 6), leaving only the variables that are linear predictors of this attitude. CFC is the Consideration of Future Consequences scale, with two subscales. An interactive online version of this figure can be found here: <http://tabsoft.co/3skld8h>

People who experience more COVID-19-related stress and live in regions with higher COVID-19 incidence report wearing a face mask to protect others

Generally, respondents agreed with the statement “*I wear a face mask when going out in public to prevent others from getting sick in case that I may be infected but don’t know it yet*” ($M = 5.1$, $SD = 2.1$). Stress and the COVID-19 incidence rate were significant positive predictors of this attitude (Figure 5; see also Supplementary Tables 7 & 8 and Supplementary Figure 4). The more COVID-19-related stress respondents reported and the more cases in their local area, the more they agreed with the statement that they wear a mask to protect others. Age and Consideration of Future Consequences both failed to pass the test of parallel lines, meaning that the effects of these variables were different across different levels of responses. Older individuals tended to disagree with the statement that they wear masks to protect others, and younger individuals were more likely to select a neutral stance or moderate agreement with this attitude (i.e. 4, 5). Individuals with high Consideration of Future Consequences tended to agree with this statement, though they were less likely to answer with the strongest response (i.e. 7) compared to those who were low in Consideration of Future Consequences.

Figure 5. This figure shows the variables that were associated with participants' agreement with the statement “I wear a face mask when going out in public to prevent others from getting sick in case I may be infected but don’t know it yet.” The effects on the dependent variable were standardized using beta estimates from a partial proportional odds model. Circles represent standardised beta estimates (β) and bars represent 95% confidence intervals. Each item was colored by significance where predictors significant at $p < .05$ (two sided) are represented by the darker shade of blue, and those over this significance level are a lighter shade. Variables that failed the parallel lines test have been excluded from this figure (see supplementary Table 8), leaving only the variables that are linear predictors of this attitude. CFC is the Consideration of

Future Consequences scale, with two subscales. An interactive online version of this figure can be found here: <http://tabsoft.co/3skld8h>

Higher stress, Consideration of Future Consequences, youth, and left-leaning political orientation predicted agreement with the attitude that wearing a face mask is the right thing to do.

Overall, respondents tended to agree with the statement “*Wearing a face mask when going out in public is the right thing to do*” ($M = 5.6$, $SD = 1.7$), and all predictors passed the parallel lines test. The more stress people felt surrounding COVID-19 and the greater their Consideration of Future Consequences, the more they agreed that wearing a mask is the right thing to do (Figure 6; see also Supplementary Table 9 and Supplementary Figure 5). Political orientation and age were also significant predictors. Younger and more politically left-leaning participants were more likely to agree that wearing a mask in public is the right thing to do.

Figure 6. This figure shows the variables that were associated with participants' reports that “Wearing a face mask when going out in public is the right thing to do.” The effects on the dependent variable were standardized using beta estimates from a partial proportional odds model. Circles represent standardised beta estimates (β) and bars represent 95% confidence intervals. Each item was colored by significance where predictors significant at $p < .05$ (two sided) are represented by the darker shade of blue, and those over this significance level are a lighter shade. All predictor variables passed the parallel lines test indicating that they linearly predict this attitude. CFC is the Consideration of Future Consequences scale, with two

subscales. An interactive online version of this figure can be found here:
<http://tabsoft.co/3skld8h>

Politically left leaning respondents and those with higher perceived risk of infection report that they are willing to wear a mask in public spaces for a longer period of time

When responding to the question: *“How long would you be willing to wear a mask in public spaces to limit the spread of the disease?”*, participants claimed they would be willing to wear a mask for about nine months on average ($M = 7.1$, $SD = 3.5$; where 7 corresponds to nine months, and 8 to one year), and this attitude was predicted by four variables (Figure 7; see also Supplementary Tables 10 & 11 and Supplementary Figure 6). People with greater perceived risk of infection and people who were politically inclined to the left reported being willing to wear a mask for a longer period of time. Consideration of Future Consequences and age were also significant predictors, but in a non-linear fashion. While individuals with a high Consideration of Future Consequences were willing to wear a mask for longer, they were only slightly more likely to report that they would wear a mask for the longest option provided (i.e., forever). Older individuals tended to report that they were willing to wear a mask for a shorter period of time (i.e., not at all to 2 months), whereas younger respondents selected options in the middle of the available responses (i.e., 4 months to 1 year). Both Consideration of Future Consequences and age did not pass the test of parallel lines because of these non-linear effects.

Figure 7. This figure shows the variables that were associated with participants' responses to the question: “How long would you be willing to wear a mask in public spaces to limit the spread of the disease?” The effects on the dependent variable were standardized using beta estimates

from a partial proportional odds model. Circles represent standardised beta estimates (β) and bars represent 95% confidence intervals. Each item was colored by significance where predictors significant at $p < .05$ (two sided) are represented by the darker shade of blue, and those over this significance level are a lighter shade. Variables that failed the parallel lines test have been excluded from this figure (see supplementary Table 11), leaving only the variables that are linear predictors of this attitude. CFC is the Consideration of Future Consequences scale, with two subscales. An interactive online version of this figure can be found here: <http://tabsoft.co/3skld8h>

Table 1. Summary results from regressions indicating if prevalence of COVID-19, demographic, and future orientation predict mask wearing attitudes.

	Masks make me feel anxious β [95% CI]	Masks make me feel safe β [95% CI]	Wear mask to protect self β [95% CI]	Wear mask to protect others β [95% CI]	Mask wearing is the right thing to do β [95% CI]	How long willing to wear a mask β [95% CI]
COVID-19 incidence rate	-.05 [-.14, .05]	.10 [0, .19]	.16 [.07, .25]	.11 [.02, .21]	.01 [-.08, .10]	.01 [-.08, .09]
COVID-19 perceived risk	-.02 [-.13, .08]	.08 [-.02, .18]	0 [-.10, .10]	.06 [-.04, .16]	.03 [-.07, .13]	.11 [.01, .21]
COVID-19 stress	.37 [.27, .48]	.22 [.12, .32]	.29 [.19, .39]	.19 [.08, .29]	.24 [.14, .34]	.05 [-.04, .15]
Age	-	-.11 [-.2, -.01]	-	-	-.13 [-.23, -.04]	-
Sex (Women)	0 [-.19, .19]	-.05 [-.24, .13]	-.12 [-.31, .07]	-.13 [-.32, .06]	-.03 [-.22, .16]	.03 [-.15, .22]
Education	.05 [-.06, .15]	-.01 [-.11, .09]	-.03 [-.13, .06]	.03 [-.07, .13]	-.07 [-.17, .03]	-.03 [-.13, .07]
Subjective SES	-.03 [-.13, .07]	.07 [-.03, .16]	.10 [0, .19]	.06 [-.04, .15]	.04 [-.05, .14]	-.01 [-.10, .09]
Political Orientation	.05 [-.05, .15]	-.14 [-.24, -.05]	0 [-.10, .09]	-.05 [-.15, .05]	-.13 [-.23, -.04]	-.17 [-.26, -.07]
CFC-immediate consequences	.12 [.01, .22]	.05 [-.05, .15]	.08 [-.02, .18]	-.03 [-.13, .07]	.10 [0, .20]	-.05 [-.14, .05]
CFC-future consequences	-.18 [-.28, -.07]	-	-	-	.22 [.12, .32]	-

Note. Values reflect standardized beta estimates from partial proportional odds models; numbers in brackets provide their 95% confidence intervals. Beta estimates significant at $p < .05$ are bolded. “-” indicates effects that did not pass the test of parallel lines for its particular model. For a more detailed explanation of the predictions for these variables, see the supplementary tables associated with that attitude.

Discussion

Overall, participants in our study reported that they felt safe and not anxious when seeing others wear masks in public. They reported that wearing a mask was the right thing to do, they claimed they wore a mask to protect both others and themselves, and indicated that they would be willing to wear a mask for about nine more months from the date of the survey. Regression analyses revealed that the COVID-19 incidence rate, COVID-19-related stress, age, Consideration of Future- but not Immediate Consequences, and political orientation were the most common predictors of these attitudes. In the following section we contextualized these findings by integrating results from our previous work looking at correlates of mask-wearing behaviors (Guevara Beltran et al., 2020).

COVID-19 incidence rate predicts feeling safe when seeing people wear face masks and willingness to wear a mask to protect others and oneself

We found that several attitudes toward mask wearing were influenced by the local prevalence of COVID-19. In locations with higher incidence rates (i.e., number of COVID-19 cases per 100,000 individuals), people were more likely to report that seeing other people wearing masks in public made them feel more safe. Many factors may have influenced this relationship. Governmental responses (e.g., lockdowns and mask mandates) may have been stronger in areas with a greater prevalence of the disease. As a result, people from these locations may have had more faith in public health practices including mask wearing. It could also have been that, in regions with a higher incidence rate, community mask wearing was more quickly adopted. This might have rapidly normalized mask wearing, making people feel safe when seeing others wearing masks. In communities where mask wearing was quickly adopted, social feedback (Oerlemans et al., 1972) may have played an important role. Social feedback, or social reinforcement, is a powerful mechanism for behavioral change across many domains from education and therapeutic programs (Bandura and McDonald, 1963) to the context of ecosystems and hazard, disaster, and crisis (Tidball and Aktipis, 2018; Tidball and Krasny, 2013; Tidball and Stedman, 2013; Tidball et al., 2018). More research is necessary to look at whether the adoption of mask wearing involved social feedback and social contagion (Marsden, 1998). If protective public health practices like mask wearing can spread more quickly than the

disease that they are protecting from, then this provides a window of responsiveness that can help to contain a growing pandemic.

Respondents from areas with higher incidence rates also reported that they were more willing to wear masks, both to protect others and themselves. This pattern fits with the positive association between local incidence rate and self-reported mask-wearing behavior that we found in previous analysis of this sample, where individuals from areas with a higher incidence rate were more likely to report wearing a face mask when in public (Guevara Beltran et al., 2020). Additionally, virus prevalence may have increased feelings of interdependence within one's community, a feeling that often emerges in times of crisis (Junger, 2016; Reger, Piccirillo, & Buchman-Schmitt, 2020). People who live in the same region during a pandemic are interdependent in a very real way -- their likelihood of infection increases as more members of their communities become infected. Greater feelings of interdependence could, in turn, lead to an increased desire to protect others in one's community.

People with more COVID-19-related stress report that seeing others wearing masks makes them feel both more safe and more anxious

One of the more unexpected findings from our study is that people who report more COVID-19 stress were more likely to claim that seeing other people wear masks makes them feel safer and also makes them feel more anxious. This suggests that greater disease-related stress might lead to stronger emotional responses to seeing others wear masks. It is also possible that high COVID-19-related stress makes some people more likely to accept the risks associated with COVID-19 (and feel that they are safer when others are wearing masks) while it makes others more likely to deny that such risks exist (and feel more anxious when seeing others wear masks because this reminds them of potential risks that they avoid contemplating).

People with COVID-19-related stress were also more likely to report that they wore a mask to protect both others and themselves and were more likely to agree that wearing a mask is the right thing to do. This could be because the more stress people feel about COVID-19, the more they participate in disease mitigation behaviors (e.g. Taylor et al., 2020) and the more they want others to do so as well. COVID-19-related stress may come with benefits in terms of increasing compliance with behaviors that reduce infection rates while also bringing about negative health

outcomes such as exacerbating anxiety and other mental health issues (Montano & Acebes, 2020). Decision makers who create public health messaging should consider the diverse influences of disease-related stress when constructing their materials.

Perceived risk of infection weakly predicted how many months people were willing to wear a mask and did not predict other attitudes

Perceived risk of infection marginally predicted only one attitude: the length of time that they were willing to wear a mask. The overall lack of predictive power is in contrast to our previous work where we found perceived risk of infection was correlated with reported mask-wearing behavior (Guevara Beltran et al., 2020). However, it is more in line with other studies that found perceived risk of infection to be less predictive of protective behaviors than other factors, such as perceived threat to life (Brown, Coventry, & Pepper, 2020a). Those who believe that the SARS-CoV-2 virus is highly infectious may experience a “fatalism effect” where they become less likely to perform disease-avoidance behaviors (Akesson et al., 2020). The fatalism effect may similarly lead to less favorable attitudes toward mask wearing for some individuals with a high perceived risk of infection.

Age predicts less favorable attitudes toward masks and decreased desire to wear a mask to protect both others and oneself

Age was associated with every mask-wearing attitude measured in this study. Older individuals were less likely to agree that wearing a mask is the right thing to do and were more likely to indicate that they were only willing to wear a mask for a short amount of time. Older respondents were also less willing to wear a mask to protect others and themselves. Older individuals reported feeling less safe and were more likely to either strongly agree or strongly disagree that they felt anxiety when seeing others wear masks in public. Many of these responses seemed somewhat puzzling given the fact that older individuals on average have more severe infections from COVID-19 than do younger people, and are more likely to die from COVID-19 than younger individuals (Mueller, McNamara, & Sinclair, 2020). This raised the interesting possibility that older individuals’ greater reluctance about mask wearing and anxiety from seeing others wear masks might be a result of cognitive dissonance (Festinger, 1957). To

cope with their greater susceptibility to severe infection and death from the virus, they could either put increased effort into disease-avoidance behaviors or discount the disease's ability to cause harm.

Two alternative explanations for these results have to deal with knowledge about the disease and familiarity with masks. Previous work has found that older individuals tend to hold different beliefs about COVID-19 than younger people: A study of workers in China found that older individuals had less knowledge about COVID-19 than did younger people (Li et al., 2020), another study in Hungary found that older people reported less stress associated with the disease (Szabo, Ábel, & Boros, 2020), and a third study in the US showed that Baby Boomers (i.e., people born between the years of 1946 and 1964) believed they have lower risk of infection than millennials (i.e., people born between the years of 1981 and 1996; Masters et al., 2020). Perhaps older individuals in our sample have less favorable attitudes towards masks because they too are less knowledgeable about the disease. In this sample, age was not correlated with COVID-19-related stress or perceived risk of infection (Guevara Beltran et al., 2020), so if a knowledge gap is driving these results it may be that older individuals have a deficit in knowledge toward the benefits of mask wearing, as opposed to different beliefs about the threat of the disease. Alternatively older individuals may have been less active, leaving their home with reduced frequency than younger individuals because they were advised to follow more restrictive social distancing practices (Röhr, Reininghaus, & Riedel-Heller, 2020). With fewer in-person interactions, these individuals would have had fewer occasions to wear masks, which could result in less familiarity and comfort with masks.

More politically left-leaning individuals report more positive attitudes towards mask wearing

Political orientation also predicted many attitudes. Respondents who were politically inclined to the left were more likely to report that seeing others wearing face masks in public makes them feel more safe, that wearing a mask is the right thing to do, and that they are willing to wear a mask for a longer period of time. These associations may be influenced by differences in where individuals access information about the disease. Previous work has found that political orientation can affect both where and how an individual acquires information (Robertson, 2017), and more recent studies during the COVID-19 pandemic have shown that disease avoidance

behaviors systematically differ depending on the news sources that an individual trusts (Zhao et al., 2020). Those with a left-leaning political orientation may access news sources that provide more favorable evidence of the benefits associated with mask wearing or that emphasize the public health consequences of the disease. Accordingly, they may hold more positive attitudes toward masks. Alternatively, mask wearing has become a politicized issue, at least in the United States (Halpern, 2020), and perhaps attitudes and behaviors associated with mask wearing have thus become signals of group affiliation by political leanings. Indeed, a recent study finds that people in the US with a right-leaning political orientation view both ethnic ingroups and outgroups more favorably when others do not wear a mask compared to when others do wear a mask ([Boykin et al. 2021](#))

Sex and education were not associated with attitudes towards mask wearing

In our sample, we did not find any associations between mask attitudes and either sex or education. The lack of influence of sex was particularly surprising because previous work has found sex differences in perceptions of the disease, with women believing the pandemic poses a larger threat than men (Perrotta et al., 2020; Brown, Coventry, & Pepper, 2020b). Other work has found gender differences in attitudes toward governmental policies that restrain activity (e.g. closing non-essential shops, limiting non-essential travel, imposing a quarantine), with women being more likely to agree with these policies (Galasso et al., 2020). Another study found that, though gender predicted some mask-wearing perceptions (e.g. women were less likely to perceive mask wearing as infringing on their independence), it did not predict others (e.g. perceiving mask wearing as inconvenient, (Howard, 2020). Our attitudes may have been similar to those that were found to be stable across genders because we did not include an item on independence or other more traditionally masculine traits. Future studies with a larger number of attitudes may shed light on the specific attitudes that vary by gender.

Consideration of Future Consequences predicts every attitude toward mask wearing and willingness to wear a mask

Individuals who scored highly in Consideration of Future Consequences reported greater feelings of safety and lower feelings of anxiety from seeing others wear masks in public,

believed that wearing a mask is the right thing to do, and indicated that they would wear a mask for a longer period of time. These findings align with previous research on Consideration of Future Consequences in health contexts. For example, during the H1N1 epidemic, Consideration of Future Consequences was associated with greater perceived: severity of the flu, effectiveness of the vaccine, and self-efficacy at preventing infection (Nan & Kim, 2014). Those high in Consideration of Future Consequences engage in health-oriented behaviors (e.g. Orbell & Hagger, 2006, Orbell & Kyriakaki, 2008, Strathman et al., 1994) because they adopt a promotion orientation, focusing on how their individual efforts enable the achievement of their goals (Joireman et al., 2012). As such, individuals high in Consideration of Future Consequences likely maintain more positive attitudes toward face masks by focusing on the benefits of using them.

Another contributing factor may be that individuals with high Consideration of Future Consequences were more receptive to advice with distal outcomes (Kees, 2011). Perhaps these respondents are more apt to respond to health messaging that indicates the long term and broader benefits of wearing a mask. Still another explanation could involve prosocial tendencies. Individuals who are high in Consideration of Future Consequences also score higher on scales of organizational citizenship behavior, which includes such items as helping others, organizational compliance, and civic virtue (Joireman et al., 2006). Individuals who score high on these scales showed greater intention to help the groups they belong to, thus Consideration of Future Consequences may be correlated with being a 'good citizen' and complying with public health measures. Finally, we found in our previous work that Consideration of Future Consequences is positively associated with COVID-19-related stress (Guevara Beltran et al., 2020). It is of note that Consideration of Future Consequences predicted each attitude in regression models with COVID-19-related stress as another explanatory variable. Those high in Consideration of Future Consequences must adopt these attitudes for reasons outside of and in addition to their greater concern with the disease.

In contrast to Consideration of Future Consequences, Consideration of Immediate Consequences predicted only one attitude: Individuals with greater Consideration of Immediate Consequences were more likely to report that they felt anxious when they saw others wear masks in public. It is possible that people with greater Consideration of Immediate Consequences are more concerned about the negative short term outcomes of disease avoidance behavior, such as the discomfort of wearing a mask, whereas those with greater

Consideration of Future Consequences may be focused on the more positive distant outcomes such as lowering the spread of the disease.

One final item of interest is that Consideration of Future Consequences frequently failed the test of parallel lines in our regression models, indicating non-linear effects on the dependent variables. Respondents high in Consideration of Future Consequences were less likely to take an extreme position on several of these attitudes even though they were generally more likely to agree with them. It is possible that these future-oriented individuals were more likely to hedge their responses to avoid overconfident claims or were more moderate or cautious in general. We leave this as an open question for future work.

Limitations and Future Directions

Our results may not generalize to other locations

Our participants hailed from countries around the world, but predominantly from Europe. Using an international sample came with strengths and weaknesses. For example, an international sample allowed us to avoid idiosyncrasies based on a single country's norms and behaviors. Because there was considerable variation in mask-wearing behavior between countries (Cheng et al., 2020) and even within a single country (e.g. Haischer et al., 2020; Lyu & Wehby, 2020), a diverse international sample may have allowed us to better identify traits that drive attitudes and behaviors associated with masks across nations. However, as this sample is predominantly European, our results may fail to generalize to other locations, such as east Asian countries (Henrich, Heine, & Norenzayan, 2010). More targeted studies can inform decision makers about the unique characteristics of their specific populations.

We cannot make causal inferences about mask wearing attitudes based on these analyses

The results of this paper were based on self-report data. As a result, although we observed reliable associations between mask-wearing attitudes and the prevalence of COVID-19-related stress, age, political orientation, and Consideration of Future Consequences, we cannot make causal inferences about these relationships. Future work may employ experimental

manipulations and more controlled study designs to tease apart the causal mechanisms. Priming individuals to focus on particular aspects of their identity (e.g., age and political orientation) and modifying disease-relevant information (e.g., short- and long-term consequences of COVID-19) may shed light on these important questions.

Cognitive dissonance may lead some individuals to discount potential harm from COVID-19

Our analysis revealed that individuals who are more vulnerable or more stressed about COVID-19 had inconsistent emotional responses to seeing others wear masks. For example, among older individuals (who are more vulnerable to severe disease), some of them reported that seeing others wear masks in public led them to feel more anxious, while others strongly disagreed that masks made them anxious. Similarly, among those with higher disease-related stress, some individuals reported that seeing others wear masks in public made them feel anxious while others reported that it made them feel more safe. We found a negative correlation between reported feelings of safety and anxiety when seeing others wear masks ($\rho = -0.22$, $p < .001$), among those reporting higher than average stress, suggesting that these are indeed two separate groups.

This brings up the possibility that some people who are more stressed by or vulnerable to COVID-19 may deal with that stress or vulnerability through suppressing uncomfortable emotions and thoughts, but that seeing others wearing masks might remind them of that vulnerability. Thus, it is possible that cognitive dissonance (in this case, knowing that one is vulnerable but also having negative attitudes towards masks that are protective) could play a role in mask wearing behavior. If so, interventions based on reducing cognitive dissonance could be useful for increasing mask wearing compliance. Although our current data do not allow us to test whether some people with greater perceived risk of infection or stress also report lower vulnerability to the disease should they become infected, our ongoing longitudinal study of COVID-19 in the United States will allow us to test this possibility.

Conclusion

We sought to understand the factors associated with variation in attitudes toward mask wearing. Generally, participants believed wearing a mask was the right thing to do, claimed that they were willing to wear a mask to protect others and themselves, reported feeling safe and not anxious when seeing others wear masks in public, and demonstrated considerable variation in how long they were willing to wear a mask.

We found that higher prevalence of COVID-19 was associated with increased feelings of safety when seeing others wearing masks in public and increased intention to protect others and oneself through mask wearing. COVID-19-related stress also predicted increased intention to wear masks as well as (contradictorily) both feelings of anxiety and safety in response to seeing others wear masks in public. Older individuals and those who reported being more politically to the right had less favorable views of masks and reported that they did not feel safer when seeing others wear masks in public. Finally, participants with greater Consideration of Future Consequences were less likely to report feelings of anxiety and more likely to report feelings of safety when seeing others wear masks in public, were more likely to claim they wore a mask to protect both others and themselves, had more favorable views of masks, and claimed they would wear a mask for a longer period of time.

The correlates of attitudes towards mask wearing described here may be useful for health policy efforts aiming to increase mask wearing and other health-protective behaviors. Understanding the relationship between mask-wearing attitudes and behaviors, as well as the variety of factors that predict these opinions and actions, can inform data-driven interventions to combat further spread of the disease. In our next preprint we explore how these attitudes, demographics, and other psychological factors contribute to variation in mask-wearing behavior in routine as well as recreational settings.

References

- Akesson, J., Ashworth-Hayes, S., Hahn, R., Metcalfe, R. D., & Rasooly, I. (2020). Fatalism, Beliefs, and Behaviors During the COVID-19 Pandemic (No. w27245). *National Bureau of Economic Research*.
- Appleby, P. R., Marks, G., Ayala, A., Miller, L. C., Murphy, S., & Mansergh, G. (2005). Consideration of future consequences and unprotected anal intercourse among men who have sex with men. *Journal of Homosexuality*, 50(1), 119–133.
- Asselmann, E., Borghans, L., Montizaan, R., & Seegers, P. (2020). The role of personality in the thoughts, feelings, and behaviors of students in Germany during the first weeks of the COVID-19 pandemic. *PloS one*, 15(11), e0242904.
- Ayers, J. D., Guevara Beltran, D., Alcock, J., Baciú, C., Claessens, S., Cronk, L., Hudson, N. M., Miller, G., Tidball, K., Winfrey, P., Zarka, E., Todd, P. M., & Aktipis, A. (2020, May 27). How is the COVID-19 pandemic affecting cooperation?. <https://doi.org/10.31234/osf.io/pk6jy>. PsyArXiv.
- Bandura, A., & McDonald, F. J. (1963). Influence of social reinforcement and the behavior of models in shaping children's moral judgment. *The Journal of Abnormal and Social Psychology*, 67(3), 274.
- Bish, A., & Michie, S. (2010). Demographic and attitudinal determinants of protective behaviours during a pandemic: a review. *British Journal of Health Psychology*, 15(Pt 4), 797–824.
- Boykin, K., Brown, M., Macchione, A. L., Drea, K. M., & Sacco, D. F. (2021). Noncompliance with Masking as a Coalitional Signal to US Conservatives in a Pandemic. *Evolutionary Psychological Science*. <https://doi.org/10.1007/s40806-021-00277-x>
- Brant, R. (1990). Assessing proportionality in the proportional odds model for ordinal logistic regression. *Biometrics*, 1171–1178.
- Brewer, N. T., Chapman, G. B., Gibbons, F. X., Gerrard, M., McCaul, K. D., & Weinstein, N. D. (2007). Meta-analysis of the relationship between risk perception and health behavior: the example of vaccination. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, 26(2), 136–145.
- Brown, R. D., Coventry, L., & Pepper, G. V. (2020, July 30). COVID-19: the relationship between perceptions of risk and behaviours during lockdown. <https://doi.org/10.31219/osf.io/dwjvy>

- Brown, R. D., Coventry, L., & Pepper, G. V. (2020, July 30). COVID-19 risk perceptions and their associations with related media consumption and personal experiences.
<https://doi.org/10.31219/osf.io/gcz27>
- Clark, C., Davila, A., Regis, M., & Kraus, S. (2020). Predictors of COVID-19 voluntary compliance behaviors: An international investigation. *Global Transitions*, 2, 76–82.
- Capraro, V., & Barcelo, H. (2020). The effect of messaging and gender on intentions to wear a face covering to slow down COVID-19 transmission. <https://doi.org/10.31234/osf.io/tg7vz>
- Centers for Disease Control and Prevention. (2020, August 6). About Cloth Face Coverings. CDC.gov.
<https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/about-face-coverings.html>
- Cheng, V. C., Wong, S. C., Chuang, V. W., So, S. Y., Chen, J. H., Sridhar, S., Kai-Wang, K., Chan, J.F.W, Hung, I. F. N., Ho, P.L. & Yuen, K. Y. (2020). The role of community-wide wearing of face mask for control of coronavirus disease 2019 (COVID-19) epidemic due to SARS-CoV-2. *Journal of Infection*.
- Chu, D. K., Akl, E. A., Duda, S., Solo, K., Yaacoub, S., & Schünemann, H. J. (2020). COVID-19 Systematic Urgent Review Group Effort (SURGE) study authors. Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis. *Lancet*, 395(10242), 1973-1987.
- Dong, E., Du, H., & Gardner, L. (2020). An interactive web-based dashboard to track COVID-19 in real time. *The Lancet infectious diseases*, 20(5), 533-534.
- Eisenberger, N. I., Moieni, M., Inagaki, T. K., Muscatell, K. A., & Irwin, M. R. (2017). In *Sickness and in Health: The Co-Regulation of Inflammation and Social Behavior. Neuropsychopharmacology: Official Publication of the American College of Neuropsychopharmacology*, 42(1), 242–253.
- Festinger, L. (1957). *A theory of cognitive dissonance* (Vol. 2). Stanford university press.
- Galasso, V., Pons, V., Profeta, P., Becher, M., Brouard, S., & Foucault, M. (2020). Gender differences in COVID-19 related attitudes and behavior: Evidence from a panel survey in eight OECD countries. *NBER Working Paper*, (w27359).
- Greenhalgh, T., Schmid, M. B., Cypionka, T., Bassler, D., & Gruer, L. (2020). Face masks for the public during the covid-19 crisis. *BMJ*, 369, m1435.

- Guevara Beltran, D., Isch, C., Ayers, J. D., Alcock, J., Brinkworth, J. F., Cronk, L., Hurmuz-Sklias, H., Tidball, K. G., Van Horn, A., & , Todd, Peter M & Aktipis, A. (2020). Mask wearing is associated with COVID-19 Prevalence, Risk, Stress, and Future Orientation. <https://doi.org/10.31234/osf.io/dpa2j>
- Guevara Beltran, D., Isch, C., Ayers, J. D., Alcock, J., Brinkworth, J. F., Cronk, L., Hurmuz-Sklias, H., Tidball, K. G., Van Horn, A., & , Todd, Peter M & Aktipis, A. (2021). What Contributes to Variation in Mask Wearing? Pandemic Related Stress and the Intention to Protect Oneself are Associated with Greater Mask Wearing Across Situations, Other Factors are Context Dependent. Manuscript in preparation.
- Halpern, L. W. (2020). The Politicization of COVID-19. *AJN The American Journal of Nursing*, 120(11), 19-20.
- Haischer, M. H., Beilfuss, R., Hart, M. R., Opielinski, L., Wrucke, D., Zirgaitis, G., Uhrich, T. D., & Hunter, S. K. (2020). Who is wearing a mask? Gender-, age-, and location-related differences during the COVID-19 pandemic. *PloS one*, 15(10), e0240785.
- Henrich, J., Heine, S. J., & Norenzayan, A. (2010). Most people are not WEIRD. *Nature*, 466(7302), 29-29.
- Hoedl, M., Eglseer, D., & Bauer, S. (2020). Associations between personal protective equipment and nursing staff stress during the COVID-19 pandemic. medRxiv.
- Howard, M. C. (2020). Gender, face mask perceptions, and face mask wearing: Are men being dangerous during the COVID-19 pandemic?. *Personality and individual differences*, 170, 110417.
- Joireman, J., Daniels, D., George-Falvy, J., & Kamdar, D. (2006). Organizational Citizenship Behaviors as a Function of Empathy, Consideration of Future Consequences, and Employee Time Horizon: An Initial Exploration Using an In-Basket Simulation of OCBs 1. *Journal of Applied Social Psychology*, 36(9), 2266-2292.
- Joireman, J., Shaffer, M. J., Balliet, D., & Strathman, A. (2012). Promotion orientation explains why future-oriented people exercise and eat healthy: evidence from the two-factor consideration of future consequences-14 scale. *Personality & Social Psychology Bulletin*, 38(10), 1272–1287.
- Jørgensen, F. J., Bor, A., & Petersen, M. B. (2020). Compliance Without Fear: Predictors of Protective Behavior During the First Wave of the COVID-19 Pandemic. PsyArXiv. May, 19.

https://slack-files.com/files-pri-safe/TBY1XTCCR-F014JMR8N73/compliance_without_fear.pdf?c=1597765636-f25ab85dc72655bc

Junger, S. (2016). *Tribe: On homecoming and belonging*. Twelve.

Kachanoff, F. J., Bigman, Y. E., Kapsaskis, K., & Gray, K. (2020). Measuring Two Distinct Psychological Threats of COVID-19 and their Unique Impacts on Wellbeing and Adherence to Public Health Behaviors. In *PsyArXiv Preprints*. The University of North Carolina at Chapel Hill . <https://doi.org/10.31234/osf.io/5zr3w>

Kees, J. (2011). Advertising framing effects and consideration of future consequences. *Journal of Consumer Affairs*, 45(1), 7-32.

Li, Z. H., Zhang, X. R., Zhong, W. F., Song, W. Q., Wang, Z. H., Chen, Q, Liu, D., Huang Q. M., Shen, D., Chen, P.L., Mao, A., Zhang, D., Yang, X., Wu, X.B., & Mao, C. (2020). Knowledge, attitudes, and practices related to Coronavirus disease 2019 during the outbreak among workers in China: A large cross-sectional study. *PLoS neglected tropical diseases*, 14(9), e0008584.

Liddell, T. M., & Kruschke, J. K. (2018). Analyzing ordinal data with metric models: What could possibly go wrong?. *Journal of Experimental Social Psychology*, 79, 328-348.

Lyu, W., & Wehby, G. L. (2020). Community Use Of Face Masks And COVID-19: Evidence From A Natural Experiment Of State Mandates In The US: Study examines impact on COVID-19 growth rates associated with state government mandates requiring face mask use in public. *Health affairs*, 39(8), 1419-1425.

Marsden, P. (1998). Memetics and social contagion: Two sides of the same coin. *Journal of Memetics-Evolutionary Models of Information Transmission*, 2(2), 171-185.

Masters, N. B., Shih, S. F., Bukoff, A., Akel, K. B., Kobayashi, L. C., Miller, A. L., Harapan, H., Lu, Y., & Wagner, A. L. (2020). Social distancing in response to the novel coronavirus (COVID-19) in the United States. *PloS one*, 15(9), e0239025.

Montano, R. L. T., & Acebes, K. M. L. (2020). Covid stress predicts depression, anxiety and stress symptoms of Filipino respondents. *International Journal of Research in Business and Social Science* (2147-4478), 9(4), 78-103.

Mueller, A. L., McNamara, M. S., & Sinclair, D. A. (2020). Why does COVID-19 disproportionately affect older people?. *Aging* (Albany NY), 12(10), 9959

Nan, X., & Kim, J. (2014). Predicting H1N1 vaccine uptake and H1N1-related health beliefs: The role of individual difference in consideration of future consequences. *Journal of health communication*, 19(3), 376-388.

- O'Connell, A. A. (2006). Logistic regression models for ordinal response variables (Vol. 146). Sage.
- Oerlemans, T. W., Tellings, M. M. J., & De Vries, H. (1972). World dynamics: Social feedback may give hope for the future. *Nature*, 238(5362), 251-255.
- Orbell, S., & Hagger, M. (2006). Temporal framing and the decision to take part in type 2 diabetes screening: Effects of individual differences in consideration of future consequences on persuasion. *Health Psychology*, 25(4), 537.
- Orbell, S., & Kyriakaki, M. (2008). Temporal framing and persuasion to adopt preventive health behavior: Moderating effects of individual differences in consideration of future consequences on sunscreen use. *Health Psychology*, 27(6), 770.
- Perrotta, D., Grow, A., Rampazzo, F., Cimentada, J., Del Fava, E., Gil-Clavel, S., & Zagheni, E. (2020). medRxiv.
- 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.
- Qiu, J., Shen, B., Zhao, M., Wang, Z., Xie, B., & Xu, Y. (2020). A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. *General Psychiatry*, 33(2), e100213.
- Reger, M. A., Piccirillo, M. L., & Buchman-Schmitt, J. M. (2020). CoViD-19, mental health, and suicide risk among health care workers: looking beyond the crisis. *The Journal of clinical psychiatry*, 81(5), 0-0.
- Rieger, M. O. (2020). To wear or not to wear? Factors influencing wearing face masks in Germany during the COVID-19 pandemic. *Social Health and Behavior*, 3(2), 50.
- Robertson, G. (2017). Political orientation, information and perceptions of election fraud: Evidence from Russia. *British Journal of Political Science*, 47(3), 589-608.
- Röhr, S., Reininghaus, U., & Riedel-Heller, S. G. (2020). Mental wellbeing in the German old age population largely unaltered during COVID-19 lockdown: results of a representative survey. *BMC geriatrics*, 20(1), 1-12.
- Schneiderman, N., Ironson, G., & Siegel, S. D. (2005). Stress and health: psychological, behavioral, and biological determinants. *Annual Review of Clinical Psychology*, 1, 607–628.

- Strathman, A., Gleicher, F., Boninger, D. S., & Edwards, C. S. (1994). The consideration of future consequences: weighing immediate and distant outcomes of behavior. *Journal of personality and social psychology*, 66(4), 742.
- Szabo, A., Ábel, K., & Boros, S. (2020). Attitudes toward COVID-19 and stress levels in Hungary: Effects of age, perceived health status, and gender. *Psychological Trauma: Theory, Research, Practice, and Policy*, 12(6), 572.
- Taylor, S., Landry, C. A., Paluszek, M. M., Fergus, T. A., McKay, D., & Asmundson, G. J. (2020). COVID stress syndrome: Concept, structure, and correlates. *Depression and Anxiety*, 37(8), 706-714.
- Tidball, K. G., & Aktipis, A. (2018). Feedback enhances greening during disaster recovery: A model of social and ecological processes in neighborhood scale investment. *Urban Forestry & Urban Greening*, 34, 269-280.
- Tidball, K. G., & Krasny, M. E. (Eds.). (2013). Greening in the red zone: disaster, resilience and community greening. *Springer Science & Business Media*.
- Tidball, K. G., Metcalf, S., Bain, M., & Elmqvist, T. (2018). Community-led reforestation: cultivating the potential of virtuous cycles to confer resilience in disaster disrupted social–ecological systems. *Sustainability Science*, 13(3), 797-813.
- Tidball, K., & Stedman, R. (2013). Positive dependency and virtuous cycles: from resource dependence to resilience in urban social-ecological systems. *Ecological economics*, 86, 292-299.
- Williams, R. (2006). Generalized ordered logit/partial proportional odds models for ordinal dependent variables. *The Stata Journal*, 6(1), 58-82.
- Williams, R. (2016). Understanding and interpreting generalized ordered logit models. *The Journal of Mathematical Sociology*, 40(1), 7-20.
- Xu, P., & Cheng, J. (2020, August 14). Individual Differences in Social Distancing and Mask-Wearing in the Pandemic of COVID-19: The Role of Need for Cognition, Self-control, and Risk Attitude. <https://doi.org/10.31234/osf.io/5k4ve>
- Yıldırım, M., & Güler, A. (2020). Factor analysis of the COVID-19 Perceived Risk Scale: A preliminary study. *Death Studies*, 1–8.
- Zhao, E., Wu, Q., Crimmins, E. M., & Ailshire, J. A. (2020). Media trust and infection mitigating behaviours during the COVID-19 pandemic in the USA. *BMJ global health*, 5(10), e003323.