Mask Wearing Across Routine and Leisure Activities During the COVID-19 Pandemic

Diego Guevara Beltran¹, Calvin Isch², Jessica D. Ayers¹, Joe Alcock³, Jessica F. Brinkworth^{4,5}, Lee Cronk⁶, Hector Hurmuz-Sklias, Keith Tidball⁷, Andrew Van Horn⁶, Peter M. Todd² & Athena Aktipis¹

¹Arizona State University, Department of Psychology, Tempe, AZ, US

²Indiana University, Department of Psychological and Brain Sciences, Bloomington, IN, US

³University of New Mexico, Department of Emergency Medicine, Albuquerque, NM, US

⁴University of Illinois Urbana-Champaign, Department of Anthropology, Champaign, IL, US

⁵University of Illinois Urbana-Champaign, Carl R. Woese Institute for Genomic Biology, Champaign, IL, US

⁶Rutgers University, Department of Anthropology, New Brunswick, NJ, US

⁷Cornell University, Department of Natural Resources, Ithaca, NY, US

Declarations

Funding. This study was funded by the Interdisciplinary Cooperation Initiative, ASU President's Office, the Cooperation Science Network, the Institute for Mental Health Research, the University of New Mexico, the Indiana University College of Arts & Sciences, the Rutgers University Center for Human Evolutionary Studies, the Charles Koch Foundation, and the John Templeton Foundation.

Competing interests. None.

Ethics approval. Ethics approval was granted by Arizona State University's IRB.

Consent. All participants provided informed consent prior to beginning the study.

Data and code availability. Data and code are available through OSF: osf.io/xq8r6/?view_only.

Corresponding author. Diego Guevara Beltran, Email: dguevar3@asu.edu.

This preprint has not yet been peer-reviewed

Abstract

Despite the effectiveness of face masks in reducing the spread of COVID-19, many people refused to wear them. Previous studies have shown how a variety of demographic and individual difference factors (e.g., political orientation, stress, perceived risk of infection) predict use of masks. However, people's health protective behavior can vary depending on the context they are in – a fact that has been thus far neglected in the mask wearing literature. Here, we surveyed an international sample of participants ($N = 634$, August, 2020) about their use of masks while engaging in routine and leisure activities during the first six months of the COVID-19 pandemic. People were more likely to use masks during routine than during leisure activities. In addition, wearing masks during routine activities was positively associated with pandemic-related stress, the intention to protect oneself and others, and feeling safe when others wear masks in public. Wearing masks during leisure activities was only positively associated with the intention to protect oneself and the belief that wearing masks is the right thing to do. Results also suggest that political orientation and future time orientation may have different effects on mask wearing in routine activities vs. leisure activities, warranting further study. Understanding the person by situation interactions that predict protective behaviors might help us combat future airborne transmissible diseases.

Keywords. Face masks, COVID-19, stress, time orientation, protective behaviors

Mask Wearing Across Routine and Leisure Activities During the COVID-19 Pandemic

Accumulating evidence shows that wearing face masks (hereafter “masks”) reduces the transmission of SARS-CoV-2 (Abaluck et al., 2021; Cheng et al., 2020; Chu et al., 2020; Liu & Zhang, 2020; Peeples, 2020). And experts aptly advised that people should wear masks to reduce the transmission of SARS-CoV-2 (Desai & Patel, 2020; Greenhalgh et al., 2020; MacIntyre & Chughtai, 2020; Parmet & Sinha, 2020). Despite accumulating evidence in favor of wearing masks, many people opted to not wear them in the early months of the pandemic. In this study, we looked at two main questions: (1) Why were some people more likely to wear masks than others? And (2) How much did the context of the activity (i.e., if it was a routine activity or a leisure activity) influence how often people wore masks? To look at these questions, we surveyed an international sample of participants regarding how often they wore masks during the first six months of the pandemic while engaging in various types of activities.

Recent work has shown that some key factors such as perceived risk of COVID-19 infection can motivate people to wear masks (Yıldırım & Güler, 2020), but there are still several open questions about the broader factors that promote adherence to mask wearing, and the extent to which context matters (e.g., whether people are working, or whether they are at a social event). Pre-COVID-19 research found that people are less likely to engage in protective behaviors when engaging in leisure activities compared to when engaging in routine activities (Aquino et al., 2004; Lawler et al., 2007; Peters et al., 2016). Studies looking into mask wearing during the COVID-19 pandemic focused on intentions to wear masks or in overall use of masks but have not measured mask wearing across different activities. Understanding this variation in mask wearing across different activities, as well as the factors that explain variation in mask wearing under more targeted situational contexts could help guide public health efforts aimed to reduce the transmission of future airborne communicable diseases.

Perceived risk of infection and stress can promote protective behaviors

Perceived risk of infection and moderate levels of stress often motivate people to engage in protective behaviors such as getting vaccinated and avoiding potentially infectious others (Brewer et al.,

2007; Eisenberger et al., 2017; Schneiderman et al., 2005). As with the previous SARS outbreak in 2003 (Lau et al., 2005), the COVID-19 pandemic led to a massive (and justified) increase in perceived risk of infection and pandemic-related stress in many countries (Qiu et al., 2020; Salari et al., 2020). With rising numbers of COVID-19 cases, people who lived in communities with higher prevalence of COVID-19 not only experienced higher levels of perceived risk of infection and pandemic-related stress, but also greater intentions to engage in protective behaviors such as hand washing and social distancing (Yıldırım & Güler, 2020), especially when they believed that their actions would be effective in reducing their risk of contracting COVID-19 (Clark et al., 2020; Jørgensen et al., 2020).

Perceived risk of infection and stress also interacted with people's personalities and underlying intentions when it came to their motivation to engage in protective behaviors. While some people were primarily motivated to engage in protective behaviors to protect themselves, others appear to have been primarily motivated to engage in protective behaviors to protect others. For example, highly conscientious people are more likely to experience health-related stress more frequently. In turn, this health-related stress motivated conscientious people to engage in protective behaviors (Blagov, 2020; Chan et al., 2020). In contrast, people high on agreeableness and empathy reported having greater intentions to wear masks and practice social distancing because they wanted to prevent others from becoming infected (Dinić & Bodroža, 2021; Pedersen & Favero, 2020; Pfattheicher et al., 2020).

Protective behaviors can vary across demographic groups

Research conducted prior to the COVID-19 pandemic finds that older individuals are generally more likely to engage in protective behaviors than younger individuals (Bish & Michie, 2010). During the pandemic, older individuals were also at a higher risk of mortality from COVID-19 (Jordan et al., 2020), which could have motivated them to take more protective measures than younger individuals who experienced milder symptoms. In addition to age, sex is also sometimes linked with protective behaviors. Compared to men, women reported greater intentions to wear masks and practice social distancing. However, this difference between men and women was only observed in countries where there were no mask-wearing mandates (Capraro & Barcelo, 2020), indicating that situational context can matter for

understanding adherence to protective behaviors.

Another important factor is education. People with greater educational attainment were better at searching for information online and understanding COVID-19 than people with lower educational attainment (Okan et al., 2020). As a result, people with greater educational attainment might have been better informed about the risks of COVID-19, and hence more likely to engage in protective behaviors compared to people with lower educational attainment. While some people may have lacked access to information about COVID-19 risks, others were reluctant to engage in protective behaviors.

Psychological entitlement, which is more common among high subjective socio-economic status individuals, predicted lower adherence to protective behaviors during the pandemic (Zitek & Schlund, 2020). Despite the increased risk of transmission, individuals with higher subjective socio-economic status were also more likely to attend large indoor parties during the early months of the pandemic (Ayers et al., 2022).

Another individual difference that could deter engagement in protective behaviors is political orientation. Right-leaning individuals in the US appear to have been less willing to wear masks and engage in social distancing than left-leaning individuals in part because right-leaning individuals were more likely to believe that engaging in protective behaviors infringed on their freedoms (Kachanoff et al., 2020), and in part because right-leaning individuals were motivated to signal their political affiliation (Boykin et al., 2021). In a primarily European sample, however, right-leaning individuals reported wearing masks just as often as left-leaning individuals during the months of July and August of 2020 (Guevara Beltran et al., 2020). Nevertheless, there were other notable differences between right and left-leaning individuals: left-leaning individuals were more likely to report that they felt safer when seeing others wearing masks in public, and believe that wearing a mask in public was the right thing to do (Isch et al., 2021).

Time orientation can influence protective behaviors

People can vary considerably in the extent to which they consider the immediate and future consequences of their actions (Joireman et al., 2012; Strathman et al., 1994). People who are more likely

to consider the future consequences of their actions are less likely to engage in harmful behaviors (e.g., unprotected sex), while also being more likely to engage in protective behaviors such as wearing sunscreen and eating healthily (Appleby et al., 2005; Bodecka et al., 2021; Dassen et al., 2015; Joireman et al., 2012). In line with these findings, people who are more likely to consider the future consequences of their actions were more likely to believe that wearing a mask in public was the right thing to do (Isch et al., 2021). However, it remains unclear whether consideration of future consequences accounts for mask wearing behavior, and whether this association is constant across different activity contexts.

Some contexts are more (or less) conducive to engaging in protective behaviors

Whether or not people engage in protective behaviors is dependent on not just individual differences, but also on the specific context of the activity, whether it is considered work, leisure, exercise or something else. For example, people report that a desire to engage in leisure activities (e.g., walking, playing outdoors, gardening) was one of the main reasons that they did not engage in protective behaviors against the West Nile virus (e.g., avoiding still water), a disease which is transmitted through mosquitoes (Aquino et al., 2004).

Other studies that have investigated the role of activity contexts on protective behaviors find that people who regularly engage in physical activity are less likely to be concerned about sunlight exposure, and are also less likely to wear sunscreen, compared to physically inactive individuals. In addition, there are sex differences in reported use of sunscreen, with physically active men reporting less use of sunscreen than physically active women (Lawler et al., 2007). Similarly, construction workers report being less likely to engage in protective behaviors against sunlight (e.g., wearing sunscreen) while engaging in outdoor leisure activities during the weekends, compared to during work (Peters et al., 2016). Moreover, a recent survey found that among young adults, 49% reported wearing a mask while engaging in moderately intense exercise. When engaging in high-intensity exercise, only 12% reported wearing a mask (Supriyati et al., 2021).

Overview of the present work

Because we were interested in understanding the individual differences and contexts that were

associated with mask wearing, we looked at the following two questions: (1) Why were some people more likely to wear masks than others? And (2) How much did the context of the activity (i.e., if it was a routine activity or a leisure activity) influence how often people wore masks? To address these questions, we surveyed an international cohort of participants regarding their use of masks and factors that may contribute to this protective behavior across 19 different activities people engaged in from March to August 2020. We first divided these activities into routine and leisure activities based on a cluster analysis. We then assessed how likely people were to wear masks during routine activities (e.g., work) compared to during leisure activities (e.g., dining at a restaurant). Lastly, based on our review of the individual differences known to influence mask wearing behavior, we tested whether COVID-19 prevalence, perceived risk of infection, pandemic-related stress, demographics, time orientation, attitudes, and intentions predict mask wearing during routine and during leisure activities.

Method

Participants

We recruited an international sample of participants through Prolific.co, an online recruitment platform, as part of a longitudinal study of COVID-19 and social behavior ([redacted for review]). Participants completed the survey on 14 time points, approximately every two weeks, from March to August, 2020. Here we report on data collected on August 8, 2020 ($N = 634$, $M_{age} = 29.6$, $SD_{age} = 11$, 50.7% men). Our sample consisted of participants from 36 countries covering major regions of the world (though primarily from Western countries), including continental Europe ($N = 364$), the UK and Ireland ($N = 168$), North America ($N = 81$), and various other countries ($N = 20$; no country information $N = 1$).

Measures

Mask wearing

Mask wearing behavior. Participants reported the extent to which they had worn a mask and/or socially distanced during nineteen different activities such as dining at a restaurant or during work (*Since March 13, when COVID-19 was declared a global pandemic, have you worn a mask and/or stayed 6 feet*

(2 meters) away from other people when doing the following activities?; 0 = I haven't done this activity since March 13, 1 = Never, 3 = Half the time, 5 = Always).

Mask-wearing attitudes and intentions. Participants answered the following mask-wearing attitudes and intentions (1 = *Strongly disagree* to 7 = *Strongly agree*): whether seeing others wearing masks makes them (1) feel anxious, (2) feel safe (*Seeing people in public wearing masks makes me feel anxious[safe]*); whether they wear masks to (3) protect themselves (*I wear a face mask when going out in public to keep myself from getting sick*); (4) to protect others (*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*); and (5) whether they believe wearing masks is the right thing to do (*Wearing a face mask when going out in public is the right thing to do*). We developed these items for the purposes of a previous study in which we investigated the associations between COVID-19 prevalence, perceived risk, and stress with mask-wearing attitudes and intentions ([redacted for review]).

Covid-19 prevalence

To determine the local prevalence of COVID-19, we matched participants' location information to the [COVID-19 Data Repository](#) maintained by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (Dong et al., 2020). Using this database, we used the latitude and longitude of each participants' postal code and matched the postal codes to the corresponding location in the COVID-19 Data repository¹ to determine cumulative incidence rates of COVID-19 (i.e., confirmed cases per 100,000 individuals) of 520 participants. We were not able to match the prevalence of COVID-19 for participants who did not provide postal codes or provided unidentifiable postal codes, so these individuals were excluded from the relevant analyses.

Individual differences

Demographics. Participants reported their age, sex, subjective socioeconomic status (1 = *Worse*

¹ To do this, we used the location (again using latitude and longitude) in the COVID-19 Data Repository that was the minimum Euclidean distance from each point, always selecting locations based on the highest degree of specificity possible (some countries keep data at the national level, others at the state level, and others at the county level).

off than others, 10 = *Better off than others*; (Adler et al., 2000), political orientation (1 = *Extremely to the left*, 7 = *Extremely to the right*), and educational attainment (1 = *Less than high school*, 4 = *2-year degree (Associates)*, 8 = *Doctoral or professional degree*).

Perceived risk of infection and stress. Participants reported their perceived risk of COVID-19 infection (*How likely do you think it is that you will become infected with COVID-19?*; 1 = *Not at all*, 7 = *Extremely*) and pandemic-related stress (*How stressed do you currently feel dealing with changes caused by COVID-19?*; 1 = *Not at all*, 7 = *Extremely*). These measures were developed for the purposes of the larger project ([redacted for review]). In previous work employing the same longitudinal cohort of participants, we found that perceived risk of infection was positively correlated with the local prevalence of COVID-19 (i.e., incidence rate and death rate in one's community; [redacted for review]).

We also found that our measure of pandemic-related stress showed good concurrent validity. On March 24, 2020, participants completed the Perceived Stress Scale (PSS), a widely used and validated measure of perceived stress (e.g., *In the last month, how often have you felt nervous and "stressed"?*; 1 = *Never*, 5 = *Very often*; (Cohen, 1988; Roberti et al., 2006). The PSS scale was positively correlated with our measure of pandemic-related stress during the period of data collection reported in the present study (i.e., August 8; $r = 0.36$, $p < 0.001$; [redacted for review]).

Time orientation. Participants completed the 14-item Consideration of Future Consequences Scale (Joireman et al., 2012; Strathman et al., 1994). This scale measures two factors (1 = *Strongly disagree*, 7 = *Strongly agree*): concern with immediate consequences (e.g., *"I only act to satisfy immediate concerns, figuring the future will take care of itself"*; $\alpha = 0.80$) and concern with future consequences (e.g., *"I consider how things might be in the future, and try to influence those things with my day to day behavior"*; $\alpha = 0.80$).

Participants also answered questions related to the larger project that are not part of the present paper. Analyses were conducted in SPSS V. 25 or R Studio V. 1.3.1. Code for analyses and measures employed across the longitudinal study can be found here: osf.io/xq8r6/?view_only.

Results

Who wears face masks and under which type of activities?

To test how our predictor variables contributed to variation in mask wearing across activities, we first implemented a cluster analysis to reduce the potential number of dependent variable categories. We conducted a hierarchical divisive cluster analysis applying Kendall Tau-b correlations with the *Cluster* package in R (Maechler et al., 2019). As shown in Figure 1, activities clustered along two groups: routine activities (purple) and leisure activities (green) based on participants' responses regarding their mask wearing during each activity.

Fig. 1 Dendrogram of reported mask wearing during the 19 activities included in our survey. The x-axis (i.e., distance) indicates the dissimilarity between activities. ‘Transport’ reflects mask wearing while using large public transportation, and the activity ‘Another’s house’ reflects use of masks while staying overnight at someone else’s house.

There was substantial variation in mask wearing across types of activity contexts

Participants in our study reported that they did not engage in many of the activities that we asked about from March to August 2020 (gray bars in Figure 2), with the exception of running errands. For the activities that people did engage in, there was substantial variation in mask wearing: across all activities, a

non-trivial minority reported never wearing a mask (3%-21%; light purple/green bars in Figure 2) whereas another sizable group reported that they always wore a mask (3-59%; dark purple/green bars in Figure 2).

Fig. 2 Reported mask-wearing behavior across routine and leisure activities. The activity ‘Transport’ reflects mask wearing while using large public transportation, and the activity ‘Another’s house’ reflects use of masks while staying overnight at someone else's house.

People reported wearing masks more often during routine than during leisure activities

We computed composites for mask wearing during routine activities and during leisure activities (excluding *I have not done this activity since March 13* responses). Although reported mask wearing during routine activities was positively correlated with mask wearing during leisure activities ($r = 0.48$, $p < 0.001$) paired-samples t -test shows that people reported more mask wearing during routine activities ($M = 3.94$, $SD = 0.99$) than during leisure activities ($M = 2.89$, $SD = 1.34$, $t(555) = 20.36$, $p < 0.001$, $d = 0.89$) (Figure 3). To further illustrate the difference in mask wearing between routine and leisure activities, we

can see that 54% of participants indicated that they always wore a mask during routine activities, while only 8% indicated never wearing a mask during routine activities. In contrast, only 25% of participants reported always wearing a mask during leisure activities, while 35% indicated never wearing a mask during leisure activities (see Figure S1).

Fig. 3 Reported use of mask wearing during routine and leisure activities. The x-axis represents average mask-wearing (1 = *Never*, 3 = *Half the time*, 5 = *Always*) during leisure (green) and routine (purple) activities. The y-axis shows the number of individuals. The dashed lines show the mean values per type of activity, and the colored bands show the 95% CI for each activity group.

Correlates of mask wearing during routine activities and leisure activities

In the following sections, we explore whether individual differences account for mask wearing during routine and leisure activities. Table S1 shows the correlation matrix of all variables, and Figures S2-S3 show scatter plots of individual covariates with mask wearing.

Mask wearing during routine activities

To test whether the local prevalence of COVID-19, perceived risk of COVID-19 infection, stress, age, sex, education, subjective socioeconomic-status, consideration of immediate consequences, consideration of future consequences, attitudes, and intentions, account for variation in mask wearing during the routine activities people engaged in from March to August 2020, we ran a multiple linear regression. All predictor variables were standardized except for participant sex. Pandemic-related stress, being female, the intention to protect oneself, the intention to protect others, and feeling safe when others

wear masks were all associated with greater mask wearing during routine activities. Neither consideration of future nor immediate consequences predicted mask wearing during routine activities ($F(15, 412) = 8.70, p < 0.001, R^2 = 0.24$; Table S2; Figure 4; Figure S2).

Fig. 4 Predictors of mask wearing during routine activities. Circles represent standardized beta estimates (β) and bars their 95% confidence intervals. Statistically significant associations ($p < 0.05$) are shown in dark blue. CFC = Consideration of Future Consequences scale.

Mask wearing during leisure activities

We tested whether the same predictors employed above account for mask wearing during leisure activities. All predictors except for participant sex were mean-centered and standardized. This model violated the assumption of homoscedasticity, as revealed by a Breusch Pagan Test ($\chi(1)^2 = 12.29, p = 0.0004$; *Olsrr* package, Hebbali, 2020), which tests whether residuals are equal across the dependent variable. To account for this we applied a robust covariance matrix estimator using the *Sandwich* package (Zeileis, 2004; Zeileis et al., 2020). This approach empirically calculates the covariances of the residual variances for the predictors, allowing the model to correctly estimate the standard errors and p -values. Only two variables positively predicted mask wearing during leisure activities ($F(15, 367) = 5.04, p < 0.001, R^2 = 0.17$; Table S3; Figure 5 and Figure S3): the intention to protect oneself and believing that wearing a mask in public is the right thing to do

Fig. 5 Predictors of mask wearing during leisure activities. Circles represent standardized beta estimates (β) and bars their 95% confidence intervals. Statistically significant associations ($p < 0.05$) are shown in dark blue. CFC = Consideration of Future Consequences scale.

Discussion

In the present study we tried to answer these two questions: (1) Why were some people more likely to wear masks than others? And (2) How much did the context of the activity (i.e., if it was a routine activity or a leisure activity) influence how often people wore masks? Based on a review of the literature, we looked at several potential predictors of mask wearing (e.g., local prevalence of COVID-19, perceived risk of COVID-19 infection). We also looked at whether people reported differences in mask wearing during routine vs. leisure activities. In the following sections, we discuss the broader context of findings in relation to recent work on COVID-19 and protective behaviors. We also discuss potential implications of the work and future directions.

People wore masks more often during leisure activities than during routine activities

Most people avoided activities altogether during the first six months of the pandemic, but a significant minority *never* wore masks while engaging in routine and leisure activities, and many others only wore them occasionally (see Figure 2). Moreover, participants reported wearing masks less frequently during leisure activities than during routine activities ($d = 0.89$). This is concerning because

social leisure activities may have increased the likelihood of SARS-CoV-2 transmission due to closer encounters with others. For instance, a CDC report showed that US counties that allowed indoor dining had higher COVID-19 cases and deaths from March-December 2020 than counties that did not allow indoor dining (Guy et al., 2020).

Perceived risk of infection did not directly account for mask wearing

As COVID-19 cases increased, so did perceived infection risk and pandemic-related stress in areas with a higher prevalence of COVID-19 (Guevara Beltran et al., 2020; Salari et al., 2020). Moderate levels of stress and the belief of being susceptible to infection can direct our attention to the risks of disease and motivate us to engage in behaviors that can prevent or mitigate the risk of becoming infected (Brewer et al., 2007; Eisenberger et al., 2017; Schneiderman et al., 2005; Clark et al., 2020; Jørgensen et al., 2020; Yıldırım & Güler, 2020).

Our study found that people who perceived a higher risk of COVID-19 infection were more likely to wear masks during routine and leisure activities (r 's = 0.16, p 's < 0.01; Table S1). Additionally, those who perceived a higher risk of infection had higher intentions to protect themselves ($r = 0.15$, $p < 0.01$), protect others ($r = 0.23$, $p < 0.01$), and believe that wearing masks in public was the right thing to do ($r = 0.22$, $p < 0.01$). However, perceived risk of infection did not predict mask-wearing after controlling for other variables. These findings suggest that perceiving a higher risk of infection may motivate individuals to wear masks by influencing their attitudes and intentions towards mask-wearing. For example, people who had higher intentions to protect others were more likely to wear masks during routine activities.

Pandemic-related stress predicted greater mask wearing

Previous research suggests that people who experience greater pandemic-related stress have higher intentions to wear masks to protect themselves and others. And they are also more likely to believe that wearing masks in public is the right thing to do (Isch et al., 2021). Accordingly, we found a positive correlation between pandemic-related stress and mask wearing during routine ($r = 0.24$, $p < 0.01$) and leisure ($r = 0.22$, $p < 0.01$) activities, as well as between stress and all measures of mask wearing attitudes and intentions (r 's = 0.18-0.27, p 's < 0.01) (Table S1). Even after controlling for other variables,

pandemic-related stress remained a positive predictor of mask wearing during routine activities ($\beta = 0.13$, $CI_{95\%} [0.02, 0.23]$). However, the effect of stress on leisure activities was not statistically significant when accounting for other variables ($\beta = 0.14$, $CI_{95\%} [-0.01, 0.29]$).

Demographic factors were not reliably associated with mask wearing

Although older individuals experienced higher COVID-19-related mortality (Jordan et al., 2020), they did not report wearing masks more frequently than younger individuals in this study. One reason for this could be that older individuals engaged in fewer activities that could increase their risk of infection. For example, compared to younger individuals, older people are less likely to engage in physical leisure activities like exercise (Crombie et al., 2004; Leslie et al., 2001). Additionally, many European governments strongly encouraged older people to quarantine during the pandemic (Röhr et al., 2020). Older people also reported lower motivation to make friends (Ayers et al., 2022), and they gathered in large groups less frequently during the first six months of the pandemic than younger people (Guevara Beltran et al., in prep).

In countries without mask mandates, previous research has shown that women reported higher intentions to engage in protective behaviors than men (Capraro & Barcelo, 2020; Galasso et al., 2020). Consistent with these findings, we found that women reported more frequent use of masks than men during routine activities ($\beta = 0.23$, $CI_{95\%} [0.03, 0.23]$). However, we did not observe any differences in mask wearing between men and women during leisure activities ($\beta = 0.16$, $CI_{95\%} [-0.11, 0.43]$). This suggests that the context may interact with gender to predict mask wearing. For instance, mask-wearing norms might be more strongly encouraged during routine activities than during leisure activities (e.g., at work vs. a party), and women might be more likely to adhere to these norms in such contexts than men (Galasso et al., 2020).

Future directions

This study identifies several areas for further research on mask wearing, including the influence of political orientation and time orientation. We also discuss potential practical applications of these findings, should results prove robust. These efforts could have significant implications for risk

management, not only during pandemics but also for improving overall health and enhancing population resilience against disease-related challenges.

Is stress a better indicator of mask wearing than risk of infection?

Why might pandemic-related stress be a better indicator of mask wearing than perceived risk of infection? Unlike risk appraisals, stress may be less prone to cognitive reappraisals that inhibit protective behaviors. For example, people who perceive high risk of infection may experience cognitive dissonance (Festinger, 1957) or feel invulnerable to disease (Perloff, 1987; Taha et al., 2013), leading them to believe that they do not need to engage in protective behaviors. Alternatively, some people may experience fatalism about the disease (Akesson et al., 2020), thinking that they will become infected no matter what they do. In contrast to cognitive risk appraisals, stress as an affective state may more proximally motivate people to engage in protective behaviors, and may also be less susceptible to cognitive reappraisals that inhibit protective behaviors. Future studies should aim to manipulate the perceived risk of infection, measure spontaneous appraisals of one's cognitive and affective states, as well as mask wearing intentions, to test whether perceived risk is more susceptible than stress to cognitive reappraisals that can inhibit mask wearing.

Political Orientation may influence mask wearing indirectly via attitudes and intentions

Right-leaning individuals in the United States reported lower intentions to engage in protective behaviors than left-leaning individuals, possibly because they believed that such behaviors would infringe on their freedoms, and to signal their political affiliation (Kachanoff et al., 2020; Boykin et al., 2021). Although political orientation did not account for mask wearing after controlling for other variables, we found that right-leaning individuals reported wearing masks less often during routine activities than left-leaning individuals ($r = -0.12, p < 0.01$) (Table S1). These results suggest that political orientation could indirectly influence mask wearing through beliefs about the safety and appropriateness of mask wearing. Specifically, right-leaning individuals were less likely to agree that wearing masks makes them feel safe ($r = -0.15, p < 0.01$) and that wearing masks in public is the right thing to do ($r = -0.17, p < 0.01$), which were associated with less frequent mask wearing during both routine and leisure activities. Future studies

could manipulate the salience of political affiliation, mask wearing efficacy, and mask wearing norms to further investigate the potential indirect effects of political orientation on mask wearing across different activity contexts.

Time orientation may influence mask wearing indirectly via attitudes and intentions

People who think about the future consequences of their actions are more likely to engage in protective behaviors (Appleby et al., 2005; Bodecka et al., 2021; Dassen et al., 2015; Joireman et al., 2012). Similarly, we found that consideration of future consequences was positively related to mask wearing during routine ($r = 0.20, p < 0.01$) and leisure ($r = 0.15, p < 0.01$) activities, but not when other factors were taken into account. However, consideration of future consequences was positively correlated with pandemic-related stress ($r = 0.24, p < 0.01$), the intention to wear masks to protect oneself ($r = 0.17, p < 0.01$), to protect others ($r = 0.21, p < 0.01$), the belief that wearing masks is the right thing to do ($r = 0.18, p < 0.01$), and that masks make one feel safe ($r = 0.20, p < 0.01$).

These results suggest that people who think about the future consequences of their actions may wear masks more often during routine activities because they are more likely to feel pandemic-related stress, believe in the importance of wearing masks to protect others, and feel safer when others' wear masks. Moreover, people who think about the future consequences of their actions may wear masks more often during leisure activities because they are motivated to protect themselves and because they are more likely to view wearing masks in public as the right thing to do. Future studies could investigate these associations by manipulating present versus future orientation, plausible associated consequences of one's actions (e.g., becoming infected, infecting others, loss of reputation) to test potential indirect effects of time orientation on mask-wearing behavior across routine and leisure activities.

Limitations

Measurement limitations

There are some limitations to our study. We cannot be sure if people who said they never did certain activities were avoiding them because of COVID-19 concerns or just because they do not usually do those activities. This means we might have underestimated the effect of perceived risk of infection and

stress on mask wearing. However, supplemental analyses show that perceived risk of infection and stress were not associated with the number of activities people reported doing (Table S4), suggesting that people who reported engaging in few and many activities reported similar levels of perceived risk of infection and stress. Additionally, we asked participants to rate how often they wore masks *or* stayed 6 feet away from others, so we cannot tell if someone was wearing a mask or just keeping their distance. But we can be more certain that people were being more or less careful when interacting with others.

Generalizability limitations

Our findings could be affected by differences in mask-wearing mandates between locations. In some European countries, mask mandates increased adherence to protective behaviors (Betsch et al., 2020). Gender also played a role, with women reporting higher intentions to engage in protective behaviors than men, but only in countries without mask mandates (Capraro & Barcelo, 2020). Additionally, our study mostly included people 51 years old or younger (96%), so we cannot make strong claims about the relationship between age and mask wearing.

Conclusion

We aimed to understand why some people wore masks more often than others, and whether the activity context affected mask wearing during the COVID-19 pandemic. Overall, people reported greater mask wearing when they experienced higher stress and wanted to protect themselves. To our surprise, perceived risk of infection did not directly account for mask wearing. There were also notable differences between the factors that accounted for mask wearing during routine activities compared to leisure activities, highlighting the importance of identifying not just factors that influence mask wearing, but also the contextual and situational factors associated with this protective behavior. For example, our results suggest that merely increasing access to information about the dangers of COVID-19 might not be an effective intervention, because perceived risk of infection did not account for mask wearing. Future work could use these insights to determine not just what mitigation efforts could be most effective in reducing the transmission of airborne diseases, but also where and when they could be most effectively deployed.

References

- Abaluck, J., Kwong, L. H., Styczynski, A., Haque, A., Kabir, M. A., Bates-Jeffries, E., Crawford, E., Benjamin-Chung, J., Benhachmi, S., Raihan, S., Rahman, S., Zaman, N., Winch, P. J., Hossain, M. M., Reza, H. M., Luby, S. P., Mobarak, A. M., Jaber, A. A., Momen, S. G., ... Huq, T. S. (2021). *The Impact of Community Masking on COVID-19: A Cluster-Randomized Trial in Bangladesh*.
- Adler, N. E., Epel, E. S., Castellazzo, G., & Ickovics, J. R. (2000). Relationship of subjective and objective social status with psychological and physiological functioning: preliminary data in healthy white women. *Health Psychology, 19*(6), 586–592.
- 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.
- Aquino, M., Fyfe, M., MacDougall, L., & Remple, V. (2004). Protective behavior survey, West Nile virus, British Columbia. *Emerging Infectious Diseases, 10*(8), 1499–1501.
- Ayers, J. D., Beltran, D. G., Alcock, J., Baciu, C., Claessens, S., Cronk, L., Hudson, N., Miller, G., Tidball, K. G., Winfrey, P., & al., E. (2020). How did the COVID-19 pandemic affect interdependence and cooperation? *PsyArXiv*.
- Ayers, J. D., Guevara Beltrán, D., Van Horn, A., Cronk, L., Todd, P. M., & Aktipis, A. (2022). Younger people and people with higher subjective SES experienced more negative effects of the pandemic on their friendships. *Personality and Individual Differences, 185*, 111246.
- 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.
- Blagov, P. S. (2020). Adaptive and Dark Personality in the COVID-19 Pandemic: Predicting Health-Behavior Endorsement and the Appeal of Public-Health Messages. *Social Psychological and Personality Science, 1948550620936439*.
- Bodecka, M., Nowakowska, I., Zajenkovska, A., Rajchert, J., Kaźmierczak, I., & Jelonkiewicz, I. (2021). Gender as a moderator between Present-Hedonistic time perspective and depressive symptoms or

- stress during COVID-19 lock-down. *Personality and Individual Differences*, 168, 110395.
- 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>
- 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*, 26(2), 136–145.
- 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>
- Chan, H. F., Moon, J. W., Savage, D. A., Skali, A., Torgler, B., & Whyte, S. (2020). Can Psychological Traits Explain Mobility Behavior During the COVID-19 Pandemic? *Social Psychological and Personality Science*, 1948550620952572.
- Cheng, V. C.-C., Wong, S.-C., Chuang, V. W.-M., So, S. Y.-C., Chen, J. H.-K., Sridhar, S., To, K. K.-W., 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. *The Journal of Infection*, 81(1), 107–114.
- Chu, D. K., Akl, E. A., Duda, S., Solo, K., Yaacoub, S., Schünemann, H. J., & COVID-19 Systematic Urgent Review Group Effort (SURGE) study authors. (2020). 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. *The Lancet*, 395(10242), 1973–1987.
- Clark, C., Davila, A., Regis, M., & Kraus, S. (2020). Predictors of COVID-19 voluntary compliance behaviors: An international investigation. *Global Transitions*, 2, 76–82.
- Cohen, S. (1988). *Perceived stress in a probability sample of the United States* (Vol. 251, pp. 31–67).
- Crombie, I. K., Irvine, L., Williams, B., McGinnis, A. R., Slane, P. W., Alder, E. M., & McMurdo, M. E. T. (2004). Why older people do not participate in leisure time physical activity: a survey of activity levels, beliefs and deterrents. *Age and Ageing*, 33(3), 287–292.

- Dassen, F. C. M., Houben, K., & Jansen, A. (2015). Time orientation and eating behavior: Unhealthy eaters consider immediate consequences, while healthy eaters focus on future health. *Appetite*, *91*, 13–19.
- Desai, A. N., & Patel, P. (2020). Stopping the Spread of COVID-19. *JAMA: The Journal of the American Medical Association*. <https://doi.org/10.1001/jama.2020.4269>
- Dinić, B. M., & Bodroža, B. (2021). COVID-19 Protective Behaviors Are Forms of Prosocial and Unselfish Behaviors. *Frontiers in Psychology*, *12*, 647710.
- Dong, E., Du, H., & Gardner, L. (2020). An interactive web-based dashboard to track COVID-19 in real time. *The Lancet Infectious Diseases*. [https://doi.org/10.1016/S1473-3099\(20\)30120-1](https://doi.org/10.1016/S1473-3099(20)30120-1)
- 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*, *42*(1), 242–253.
- 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* (No. w27359). National Bureau of Economic Research. <https://doi.org/10.3386/w27359>
- Greenhalgh, T., Schmid, M. B., Czypionka, 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*. *PsyArXiv*.
- Hebbali, A. (2020). *Package “olsrr.”* <https://cran.r-project.org/web/packages/olsrr/olsrr.pdf>
- 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.
- Jordan, R. E., Adab, P., & Cheng, K. K. (2020). Covid-19: risk factors for severe disease and death [Review of *Covid-19: risk factors for severe disease and death*]. *BMJ*, *368*, m1198.

- 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*.
- 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. *PsyArXiv*.
- Lau, J. T. F., Yang, X., Pang, E., Tsui, H. Y., Wong, E., & Wing, Y. K. (2005). SARS-related perceptions in Hong Kong. *Emerging Infectious Diseases*, 11(3), 417–424.
- Lawler, S., Sugiyama, T., & Owen, N. (2007). Sun exposure concern, sun protection behaviors and physical activity among Australian adults. *Cancer Causes & Control: CCC*, 18(9), 1009–1014.
- Leslie, E., Fotheringham, M. J., Owen, N., & Bauman, A. (2001). Age-related differences in physical activity levels of young adults. *Medicine and Science in Sports and Exercise*, 33(2), 255–258.
- Liu, X., & Zhang, S. (2020). COVID-19: Face masks and human-to-human transmission. *Influenza and Other Respiratory Viruses*, 14(4), 472–473.
- MacIntyre, C. R., & Chughtai, A. A. (2020). A rapid systematic review of the efficacy of face masks and respirators against coronaviruses and other respiratory transmissible viruses for the community, healthcare workers and sick patients. *International Journal of Nursing Studies*, 103629.
- Okan, O., Bollweg, T. M., Berens, E.-M., Hurrelmann, K., Bauer, U., & Schaeffer, D. (2020). Coronavirus-Related Health Literacy: A Cross-Sectional Study in Adults during the COVID-19 Infodemic in Germany. *International Journal of Environmental Research and Public Health*, 17(15). <https://doi.org/10.3390/ijerph17155503>
- Parnet, W. E., & Sinha, M. S. (2020). Covid-19—the law and limits of quarantine. *The New England Journal of Medicine*, 382(15), e28.
- Pedersen, M. J., & Favero, N. (2020). Social Distancing During the COVID-19 Pandemic: Who Are the Present and Future Non-compliers? *Public Administration Review*. <https://doi.org/10.1111/puar.13240>
- Peeples, L. (2020). Face masks: what the data say [Review of *Face masks: what the data say*]. *Nature*,

586(7828), 186–189.

- Perloff, L. S. (1987). Social Comparison and Illusions of Invulnerability to Negative Life Events. In C. R. Snyder & C. E. Ford (Eds.), *Coping with Negative Life Events: Clinical and Social Psychological Perspectives* (pp. 217–242). Springer US.
- Peters, C. E., Koehoorn, M. W., Demers, P. A., Nicol, A.-M., & Kalia, S. (2016). Outdoor Workers' Use of Sun Protection at Work and Leisure. *Safety and Health at Work*, 7(3), 208–212.
- 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.
- Roberti, J. W., Harrington, L. N., & Storch, E. A. (2006). Further psychometric support for the 10-item version of the perceived stress scale. *Journal of College Counseling*, 9(2), 135–147.
- 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), 489.
- Salari, N., Hosseini-Far, A., Jalali, R., Vaisi-Raygani, A., Rasoulpoor, S., Mohammadi, M., Rasoulpoor, S., & Khaledi-Paveh, B. (2020). Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Globalization and Health*, 16(1), 57.
- 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), 742–752.

- Taha, S. A., Matheson, K., & Anisman, H. (2013). The 2009 H1N1 Influenza Pandemic: the role of threat, coping, and media trust on vaccination intentions in Canada. *Journal of Health Communication, 18*(3), 278–290.
- Yıldırım, M., & Güler, A. (2020). Factor analysis of the COVID-19 Perceived Risk Scale: A preliminary study. *Death Studies, 1*–8.
- Zeileis, A. (2004). Econometric Computing with HC and HAC Covariance Matrix Estimators. *Journal of Statistical Software, Articles, 11*(10), 1–17.
- Zeileis, A., Köll, S., & Graham, N. (2020). Various Versatile Variances: An Object-Oriented Implementation of Clustered Covariances in R. *Journal of Statistical Software, Articles, 95*(1), 1–36.
- Zitek, E. M., & Schlund, R. J. (2020). Psychological entitlement predicts noncompliance with the health guidelines of the COVID-19 pandemic. *Personality and Individual Differences, 110*491.
- 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*.
- Festinger, L. (1957). A theory of cognitive dissonance (Vol. 2). Stanford university press.
- Guy GP Jr., Lee FC, Sunshine G, et al. Association of State-Issued Mask Mandates and Allowing On-Premises Restaurant Dining with County-Level COVID-19 Case and Death Growth Rates — United States, March 1–December 31, 2020. *MMWR Morb Mortal Wkly Rep 2021*;70:350–354. DOI: <http://dx.doi.org/10.15585/mmwr.mm7010e3>.
- Isch, C., Guevara Beltran, D., Ayers, J. D., Alcock, J., Cronk, L., Hurmuz-Sklis, H., Tidball, K. G., Van Horn, A., Todd, P. M., & Aktipis, A. (2021). What predicts attitudes about mask wearing? *PsyArXiv*.

Supplemental Information

Mask Wearing Behavior Across Routine and Leisure Activities During COVID-19

Diego Guevara Beltran¹, Calvin Isch², Jessica D. Ayers¹, Joe Alcock³, Jessica F. Brinkworth^{4,5}, Lee Cronk⁶, Hector Hurmuz-Sklis, Keith Tidball⁷, Andrew Van Horn⁶, Peter M. Todd² & Athena Aktipis¹

¹Arizona State University, Department of Psychology, Tempe, AZ, US

²Indiana University, Department of Psychological and Brain Sciences, Bloomington, IN, US

³University of New Mexico, Department of Emergency Medicine, Albuquerque, NM, US

⁴University of Illinois Urbana-Champaign, Department of Anthropology, Champaign, IL, US

⁵University of Illinois Urbana-Champaign, Carl R. Woese Institute for Genomic Biology, Champaign, IL, US

⁶Rutgers University, Department of Anthropology, New Brunswick, NJ, US

⁷Cornell University, Department of Natural Resources, Ithaca, NY, US

Corresponding author. Diego Guevara Beltran, Department of Psychology, Arizona State University, Tempe, AZ 85287-1104, United States. Email: dguevar3@asu.edu.

1. Supplemental Tables 1-4

2. Supplemental Figures 1-3

3. Supplemental Analyses

1. Supplemental Tables

Table S1

Correlates of mask wearing during routine and leisure activities

	Routine	Leisure	1 ^a	2	3	4	5	6	7	8	9	10	11	12	13	14
1. COVID-19 prevalence ^b	.18**	.12**														
2. Perceived risk	.16**	.16**	.09*													
3. Stress	.24**	.22**	.09*	.34**												
4. Age	-.07	.01	.08	.02	.02											
5. Sex (women)	.11**	.09*	.13**	.11**	.17**	.07										
6. Education	-.01	.05	.06	.20**	.08*	.18**	.13**									
7. Subjective SES	.04	.04	.05	.05	-.03	.03	-.04	.24**								
8. Political orientation (right)	-.12**	-.09	-.09*	-.10*	-.14**	.09*	-.16**	-.02	.18**							
9. CFC-Future	.20**	.15**	.15**	.15**	.24**	-.09*	.08	.15**	.09*	-.09*						
10. CFC-Immediate	-.10*	-.07	-.14**	-.06	-.10	-.09*	-.13**	-.09*	-.01	.16**	-.34**					
11. Wear masks to protect self	.34**	.31**	.20**	.15**	.27**	-.02	.11**	.08*	.02	-.07	.17**	-.05				
12. Masks make me feel safe	.33**	.24**	.12**	.17**	.18**	-.13**	.07	.03	.07	-.15**	.20**	-.03	.50**			
13. Masks make me feel anxious	-.11**	-.02	-.02	0	.22**	.05	-.01	.03	.01	.16**	-.07	.20**	-.001	-.18**		
14. Wearing masks is the right thing	.37**	.30**	.08	.22**	.21**	-.04	.14**	.07	-.004	-.17**	.18**	-.06	.46**	.52**	-.15**	
15. Wear masks to protect others	.38**	.28**	.11**	.23**	.19**	-.03	.08*	.09*	.01	-.10*	.21**	-.12	.56**	.48**	-.12	.61**

Note. * = $p < 0.05$, ** = $p < 0.01$. All correlations reflect Pearson's r , except correlations involving COVID-19 prevalence, which reflect Spearman Rho.

Table S2*Multiple linear regression predicting mask wearing during routine activities.*

<i>N</i> = 427	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	95% CI	
Intercept	3.34	0.16	21.42	<0.001	3.04	3.65
COVID-19 incidence rate	0.04	0.07	0.66	0.51	-0.09	0.18
COVID-19 perceived risk	0.02	0.05	0.33	0.74	-0.08	0.12
COVID-19 stress	0.13	0.06	2.34	0.02	0.02	0.23
Age	-0.06	0.05	-1.23	0.22	-0.15	0.03
Sex (women)	0.23	0.10	2.32	0.02	0.03	0.42
Education	-0.10	0.05	-1.94	0.05	-0.20	0.001
Subjective SES	0.03	0.05	0.58	0.56	-0.07	0.13
Political Orientation	-0.03	0.05	-0.68	0.49	-0.13	0.06
CFC-Future consequences	0.05	0.05	0.98	0.32	-0.05	0.15
CFC-Immediate consequences	0.003	0.05	0.05	0.96	-0.10	0.11
Other's masks make me feel safe	0.12	0.06	2.00	0.04	0.002	0.24
Other's masks make me feel anxious	-0.04	0.05	-0.89	0.37	-0.14	0.05
Wear a mask to protect self	0.15	0.06	2.43	0.01	0.03	0.27
Wear a mask to protect others	0.15	0.06	2.35	0.02	0.02	0.28
Mask wearing is the right thing to do	0.07	0.06	1.18	0.24	-0.05	0.20

Note. Statistically significant predictors ($p < 0.05$) are shown in bold.

Table S3*Multiple linear regression predicting mask wearing during leisure activities.*

<i>N</i> = 382	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	95% CI	
Intercept	2.41	0.21	11.35	<0.001	1.99	2.82
COVID-19 incidence rate	-0.03	0.10	-0.33	0.74	-0.23	0.16
COVID-19 perceived risk	0.04	0.07	0.54	0.59	-0.10	0.18
COVID-19 stress	0.14	0.08	1.80	0.07	-0.01	0.29
Age	0.05	0.07	0.65	0.52	-0.09	0.19
Sex (women)	0.16	0.14	1.14	0.25	-0.11	0.43
Education	-0.01	0.07	-0.18	0.86	-0.16	0.13
Subjective SES	0.02	0.07	0.25	0.80	-0.13	0.17
Political Orientation	-0.03	0.07	-0.47	0.64	-0.17	0.11
CFC-Future consequences	0.06	0.08	0.79	0.43	-0.09	0.21
CFC-Immediate consequences	-0.01	0.07	-0.22	0.82	-0.16	0.12
Other's masks make me feel safe	0.003	0.08	0.04	0.97	-0.16	0.17
Other's masks make me anxious	-0.07	0.07	-1.02	0.31	-0.20	0.06
Wear a mask to protect self	0.31	0.08	3.76	<0.001	0.15	0.47
Wear a mask to protect others	-0.04	0.08	-0.45	0.65	-0.20	0.13
Mask wearing is the right thing to do	0.23	0.08	2.97	0.003	0.08	0.38

Note. Statistically significant predictors ($p < 0.05$) are shown in bold.

2. Supplemental Figures

Fig. S1

Proportion of reported mask-wearing behavior during routine vs. leisure activities

Routine activities

Never engaged in such activities

Of those who did engage in such activities:

Always wore mask

Never wore mask

Leisure activities

Never engaged in such activities

Of those who did engage in such activities:

Never wore mask

Always wore mask

Note. Charts show the proportion of responses where participants indicated never engaging in an activity (left column), proportion of responses where participants indicated always wearing a mask (middle column), and proportion of responses where participants reported never wearing a mask (right column) during the routine (purple) and recreational (green) activities people engaged in from March to August, 2020.

Fig. S2*Predictors of mask wearing during routine activities*

Note. Figures show bivariate associations. Statistically significant associations ($p < 0.05$) based on the model reported in Table S2 are bordered in gray. CFC = Consideration of Future Consequences.

Fig. S3*Predictors of mask wearing during leisure activities*

Note. Figures show bivariate associations. Statistically significant associations ($p < 0.05$) based on the model reported in Table S3 are bordered in gray. CFC = Consideration of Future Consequences.

3. Supplemental Analysis

In this section we report on correlation analyses we conducted to explore whether the number of activities people engaged in was associated with their perceived risk of infection or pandemic-related stress. To explore these associations we first dichotomized our measures of mask-wearing behavior for each of the 19 activities we included in our study such that 0 indicated never engaging in an activity and 1 indicated participants engaged in the activity. We then created a sum score of the 19 activities ($M = 9.57$, $SD = 5.12$) and computed pairwise Pearson correlations. We found no association between number of activities and stress ($r(610) = 0.02$, $p = 0.68$) or between number of activities and perceived risk of infection ($r(610) = -0.02$, $p = 0.68$).

Next, we explored whether never engaging in an activity from March to August, 2020 (compared to engaging in an activity) was associated with reported perceived risk of infection, or pandemic-related stress for each of the activities included in our survey. To do so, we ran pairwise Kendall Tau-b correlations. As shown on Table S5, only three correlations were statistically significant. Compared to participants who never worked and never took a taxi, those who worked and took a taxi reported higher levels of perceived risk of infection. Compared to participants who never attended a party indoors, those who attended a party indoors reported lower levels of pandemic-related stress. However, all three associations were weak, suggesting that participants who engaged in these activities (compared to those who did not engage in a respective activity) generally did not report different levels of perceived risk of infection or stress.

Table S4*Correlates of perceived risk of infection and stress with activities*

Activity	Perceived risk	Stress
Work	0.08*	0.01
Running errands (outside)	0.07	0.03
Running errands (inside)	-0.01	0.04
Taking a taxi	0.09**	0.05
Public transportation	0.03	-0.02
Outdoors restaurant	0.03	0.02
Indoors restaurant	-0.04	-0.005
Outdoors party	-0.02	-0.03
Indoors party	-0.03	-0.07*
Outdoors gym	0.04	-0.02
Indoors gym	0.04	-0.02
Salon/barbershop	0.01	0.01
Camping	-0.02	-0.05
Hotel	0.03	-0.01
Staying overnight at another's house	-0.04	-0.05
Park	-0.04	-0.02
Doctor	0.03	0.002
Beach	-0.04	-0.03
Pool	0.01	0.01

Note. $N = 610$. ** = $p < 0.01$, * = $p < 0.05$. All correlations represent Kendall Tau-b correlations.

Activities were dichotomized such that 0 = never engaged in the activity, and 1 = engaged in the activity.

Statistically significant correlations are shown in bold.