report

Psychological correlates of prevention behaviors during the COVID-19 pandemic

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methods & analysis

Methods

Participants

The data for the study were collected through a national data survey managed by a third party, Dynata. The survey was conducted using the Qualtrics online survey platform, with a preregistered target of 3,500 participants. Quotas were set so that the sample was nationally representative in terms of age, gender, and race, with the inclusion criteria of adults (18 years of age or older), residing in the United States, and able to complete an English-language online survey. In accordance with our preregistration requirements, we excluded participants if they copied their open-ended response to the first survey question from an online search, if they wrote something off topic, or if they gave inconsistent responses to any of three questions about personal experiences with COVID-19 that allowed multiple responses. The survey was launched on April 24, 2020 and closed on May 11, 2020. A total of 41,274 individuals were invited to participate, and 4,453 of them consented and completed the survey. After excluding 392 participants who gave a plagiarized or off-topic open-ended response, 87 participants who gave inconsistent personal COVID-19 experience responses, and 18 who gave duplicate responses, we ended up with data from 3,956 participants for our analyses (a 9.6% response rate). Some analyses use a slightly smaller sample size due to missing responses on some items (for example, analyses that control for demographic variables include 3,775 participants). Participant demographics are shown in Table S1.

Table S1. Sample demographics (N = 3,956)

Characteristic	%	*M*	Range
Age (in years)		48	18–88
Gender (female)	52.65		
Marital status (married)	56.62		
Race (White only)[a]	64.96		
Asian	8.59		
Black or African American	13.22		
Hispanic	11.50		
White	69.16		
Employed	48.28		
Annual income[b]		3.59	1–5
Education (college degree)	59.15		
Chronic health condition[c]	21.82		
Political affiliation			
Democrat	42.34		
Republican	29.73		
Other	27.93		
Support for Trump policies[d]		3.68	1–5

[a]Participants could check multiple race categories. The designation "White only" refers to participants who checked the White category and no others.

[b]Annual income was reported on a 5-point scale: 1 = *less than $20,000,* 2 = *$20,000–$40,000,* 3 = *$40,000–$65,000,* 4 = *$65,000–$100,000,* 5 = *more than $100,000.*

[c]This value represents the percentage of respondents who reported having asthma, diabetes, lung disease, or heart disease.

dResponses were reported on a scale of 1 = extremely supportive to 5 = not at all supportive.

Recruitment

Participants were recruited by Dynata, which used a variety of communication methods to alert participants that a survey was available (for example, invitations and desktop and in-app alerts). To avoid self-selection bias, specific study details were not generally included in the invitation. Rather, participants were invited to "take a survey" and the details were disclosed later, when a survey had been selected for them to take within the system.

Study Design

Participants completed the survey online with a median completion time of 14.63 minutes. The study was preregistered at http://aspredicted.org/blind.php?x=9cp2xt. Relevant survey items are shown in Tables S2 and S3.

Statistical Analysis

Data reduction techniques combined individual survey items to form three behavioral measures (social distancing, respiratory hygiene, and mask wearing). Table S2 displays the survey items that measure performance of each of these behaviors along with mean responses and standard deviations. Each behavioral variable (social distancing, respiratory hygiene, and mask wearing) was computed by averaging the responses to the items in the category.

Five predictor variables (perceived effectiveness, descriptive norms, anxiety, personal experience with risk, and perceptions of local environment) were similarly computed by averaging responses to the items in each category, as shown in Table S3. For the perceived effectiveness and social norms categories, we computed separate variables for each behavior. That is, we computed a variable measuring the perceived effectiveness of social distancing by averaging the two relevant items about social distancing, and we computed analogous variables measuring the perceived effectiveness of hand washing and of mask wearing.

We used one outcome variable, the number of contacts over the past seven days with people outside the household. The self-reported count of number of exposures was skewed, with 33% of participants reporting no contacts and some participants reporting more than 1,000 contacts over the past seven days. To normalize the variable, we use a natural log transformation

Table S2. Self-report measures of adherence to three protective behaviors recommended by the Centers for Disease Control and Prevention

Survey item	*M*	SD
Social distancing		
In the past seven days, did you do any of the following?		
Tried to stay at home whenever possible	4.33	1.01
Talked to people by phone or video instead of in person	4.07	1.21
Tried to stay at least 6 feet away from other people	4.40	0.93
Reduced frequency of errands such as grocery shopping	4.02	1.20
Try to use delivery services for groceries or other needed items	2.53	1.62
Respiratory hygiene		
How often have you been doing these behaviors lately?		
Wash hands frequently	4.36	0.89
Avoid touching your eyes, nose, and mouth	3.68	1.15
Cover your cough or sneeze with a tissue	4.27	1.07
Mask wearing		
How often have you been doing these behaviors lately?		
Wear a mask when away from home	3.95	1.32

Note. All responses were reported on a scale of 1 = *not at all* to 5 = *a great deal*. The 5-point scale labels were selected on the basis of prenormed wording to facilitate parametric analysis and combination (Krosnick & Presser, 2010).

Table S3. Predictors of protective behaviors

Survey item	*M*	SD
Anxiety about COVID-19 (1 = *not at all* to 5 = *extremely*)		
In general, how anxious or worried do you feel about COVID-19?	3.15	1.18
How worried are you about getting infected with COVID-19?	3.01	1.22
How worried are you that you may spread COVID-19 to others without realizing you are infected?	2.89	1.29
If you get COVID-19, how likely do you think it is that you will need hospital care?	2.82	1.17
Personal experience of risk (1 = *yes*, 0 = *no*)		
Have you or anyone you know ever tested positive for COVID-19, been told by a doctor they may have COVID-19, or in the past week experienced any of the major symptoms of COVID-19 (fever, a dry cough, shortness of breath)?	0.28	
Perceptions of local environment (1 = *not at all* to 5 = *extremely*)		
The number of people sick with COVID-19 has recently increased dramatically in my local area.	2.51	1.17
Perceived effectiveness of protective behaviors (1 = *not at all* to 5 = *extremely*)		
How effective do you think each of these behaviors is in preventing the spread of COVID-19?		
Social distancing	4.20	0.95
Washing hands frequently	4.25	0.90
Wearing a mask when out	3.80	1.14
How important is it to you to practice each of these behaviors right now?		
Social distancing	4.38	0.94
Washing hands frequently	4.48	0.84
Wearing a mask when out	4.06	1.18
Social norms of protective behaviors (1 = *not at all* to 5 = *a great deal*)		
How much do you think the general public is engaging in each of these behaviors? (Give your best guess.)		
Social distancing	3.49	0.96
Washing hands frequently	3.60	0.91
Wearing a mask when out	3.40	0.99
How much do you think your friends and neighbors are engaging in each of these behaviors? (Give your best guess.)		
Social distancing	3.81	0.99
Washing hands frequently	3.87	0.93
Wearing a mask when out	3.57	1.12

Note. The predictors were measured by averaging scores on all items that assessed the predictor of interest. The 5-point scale labels were selected on the basis of prenormed wording to facilitate parametric analysis and combination (Krosnick & Presser, 2010).

and truncated the top 1% of responses. That is, the 40 participants who reported more than 119 contacts were treated as if they had reported 119.

Each of the three behavior variables was subjected to an ordinary least squares regression that included the five predictor variables all entered simultaneously. The perceived effectiveness and behavioral norm predictor variables were specific to the behavioral variable—that is, perceived effectiveness of social distancing predicted social distancing behavior, and so forth. An additional set of regression analyses controlled for the demographic variables of age (continuous), gender (indicator where 1 = female), marital status (indicator where 1 = married), race (indicator where 1 = White), employment (indicator where 1 = employed), income (continuous, 5-point scale), education (indicator where 1 = college degree), health condition (indicator where 1 = participant reports having asthma, diabetes, lung disease, or heart disease), and support for President Trump's policies and actions (continuous, 5-point scale). A bootstrapped mediation analysis with 5,000 samples examined the indirect path from perceived effectiveness of social distancing to self-reported social distancing behavior to number of self- reported contacts with people outside the household over the past seven days. All analyses were conducted in SAS 9.4.

Results

Table S4 shows the results of the ordinary least squares regression analysis with predictor variables entered simultaneously. Each regression shows the predictive relationship between the five psychological constructs and one of the three behaviors. For each of the three behaviors, perceived effectiveness is the strongest predictor and descriptive norms and anxiety are moderate predictors. The relative roles of descriptive norms and anxiety vary somewhat across behaviors, with anxiety playing a larger role than norms for social distancing behavior but norms playing a larger role for mask wearing behavior. Personal experience with COVID-19 risk is not predictive, and perceptions of incidence in the local environment is weakly but significantly predictive of social distancing and respiratory hygiene. Adding demographic controls to the regressions leaves the results relatively unchanged.

Mediation

Before analyzing the data, we selected social distancing behavior as our putative mediator because conceptually that behavior should be directly related to number of contacts. Also, before analyzing the data, we selected the five predictor variables to be included in the regression analyses reported above, and we decided ahead of time to test mediation of only the predictor variable that most strongly predicted social distancing behavior. Because perceived effectiveness is the strongest predictor of social distancing behavior, we examined the relationship between perceived effectiveness of social distancing and number of contacts as mediated by social distancing behavior.

A bootstrapped mediation analysis with 5,000 samples (Hayes, 2017) used perceived effectiveness of social distancing as the independent variable, self-reported social distancing behavior as the mediator variable, and number of contacts with people outside the household as the dependent variable. As shown in Figure 2, the analysis revealed a significant indirect effect, $B = -0.17$, 95% CI [−0.21, −0.14]. That is, perceived effectiveness predicted behavior, which in turn predicted contacts.

Table S4. Regression analysis

Variable	Model 1			Model 2		
	B	*SE*	*p*	*B*	*SE*	*p*
Social distancing						
Perceived effectiveness	0.47	0.01	<.0001	0.45	0.02	<.0001
Anxiety	0.18	0.01	<.0001	0.18	0.01	<.0001
Descriptive norms	0.07	0.01	<.0001	0.07	0.01	<.0001
Personal experience	0.01	0.02	.61	−0.01	0.01	.32
Local environment	0.04	0.01	.0002	0.04	0.01	.0002
Age				0.00	0.00	.0881
Female				0.12	0.02	<.0001
Married				0.04	0.03	.1328
White race				0.01	0.03	.7463
College educated				0.07	0.02	.0055
Employed				−0.06	0.02	.0098
Chronic health condition				0.07	0.03	.0194
Support for Trump policies				0.02	0.01	.0049
Income				0.04	0.01	.0006
Demographic controls?		No			Yes	
R^2		0.39			0.40	
N		3,953			3,775	
Respiratory hygiene						
Perceived effectiveness	0.51	0.02	<.0001	0.49	0.02	<.0001
Anxiety	0.12	0.01	<.0001	0.12	0.01	<.0001
Descriptive norms	0.14	0.01	<.0001	0.15	0.01	<.0001
Personal experience	−0.02	0.02	.40	−0.03	0.02	.27
Local environment	0.03	0.01	.001	0.03	0.01	.005
Age				0.00	0.00	.002
Female				0.13	0.02	<.0001
Married				0.07	0.02	.003
White race				−0.06	0.02	.008
College educated				−0.05	0.02	.042
Employed				0.06	0.02	.007
Chronic health condition				0.00	0.03	.856
Support for Trump policies				0.00	0.01	.849
Income				0.01	0.01	.665
Demographic controls?		No			Yes	
R^2		0.38			0.40	
N		3,953			3,775	
Mask wearing						
Perceived effectiveness	0.70	0.02	<.0001	0.67	0.02	<.0001
Anxiety	0.10	0.02	<.0001	0.08	0.02	<.0001
Descriptive norms	0.22	0.02	<.0001	0.23	0.02	<.0001
Personal experience	0.03	0.03	.38	0.03	0.04	.41
Local environment	0.03	0.01	.06	0.04	0.02	.008
Age				0.01	0.00	<.0001
Female				0.11	0.03	.000
Married				−0.04	0.04	.309
White race				−0.10	0.04	.007
College educated				0.02	0.03	.659
Employed				−0.03	0.03	.316
Chronic health condition				0.09	0.04	.026
Support for Trump policies				0.03	0.01	.003
Income				0.05	0.01	.002
Demographic controls?		No			Yes	
R^2		0.48			0.48	
N		3,951			3,773	

references

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). New York, NY: Guilford Press.

Krosnick, J. A., & Presser, S. (2010). Question and questionnaire design. In P. Marsden & J. Wright (Eds.), *Handbook of survey research* (2nd ed., pp. 263–313). Bingley, United Kingdom: Emerald Group.