report

Psychological predictors of prevention behaviors during the COVID-19 pandemic

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abstract

Widespread public adoption of behaviors that can prevent the spread of COVID-19 is key to controlling the infection rate. In a nationally representative survey administered April 24 to May 11, 2020, we identified psychological predictors of three preventive behaviors: social distancing, practicing respiratory hygiene (such as hand washing and coughing into a tissue), and mask wearing. All three behaviors were strongly predicted by their perceived effectiveness and were moderately predicted by anxiety about COVID-19 and by perceived behavioral norms. The perceived effectiveness of social distancing also predicted the self-reported number of exposures to people outside the household, and this relationship was mediated by social distancing behavior. In other words, greater perceived effectiveness of social distancing predicted greater compliance with distancing recommendations, which in turn was linked to lower exposure. On the basis of our findings, we suggest some actions that might promote long-term adherence to preventive behaviors even if rapidly shifting beliefs about the risks posed by the virus diminish the public's susceptibility to intervention.

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Slowing the spread of COVID-19 depends critically on the widespread and sustained public adoption of preventive measures recommended by health experts,[1] on a scale not seen in past disease outbreaks. Yet people vary considerably in the degree to which they engage in behaviors meant to limit the transmission of infectious diseases, as is evident during normal cold and flu seasons.[2] With the devastating COVID-19 pandemic continuing, an understanding of how to increase preventive behaviors is arguably more critical now than ever. Psychological theory and research can help provide that understanding and suggest ways to motivate the public to adopt and maintain preventive measures against COVID-19.

Past research indicates that the perceived effectiveness of preventive behaviors, anxiety about a threat (such as fear of catching or spreading an infectious disease), perceptions of social norms for preventive behaviors, and personal experiences with a threat are primary drivers for taking action and changing behavior in response to public health threats.[3–8] However, investigators do not know which of these psychological constructs are most predictive of behavior change in response to the COVID-19 pandemic, nor do they know which constructs correlate most closely with key recommendations of the Centers for Disease Control and Prevention (CDC): namely, engaging in social distancing (such as staying home whenever possible and keeping at least six feet distant from other people), practicing respiratory hygiene (washing hands frequently; avoiding touching the eyes, nose, and mouth; and coughing or sneezing into a tissue), and wearing face masks. Given that psychological theory suggests that some people may reduce their preventive behaviors as time goes by, leading to waves of new infections in the following months,[9] finding effective ways of reinforcing these preventive behaviors is of utmost importance. In this article, we present the results of a survey that we administered during the pandemic to provide insight into which psychological factors best predict compliance with the CDC's recommendations. Understanding these connections can help to inform the development of effective interventions for promoting and sustaining behavior change.

We conducted a nationally representative survey over 18 days in late April and early May 2020 that examined (a) potential psychological predictors of self-reported adherence to the CDC-recommended behaviors of social distancing, practicing respiratory hygiene, and mask wearing; (b) self-reported effort to perform these recommended behaviors; and (c) the number of people (other than household members) with whom respondents had contact in recent days (representing violations of social distancing and thus potential exposure to infection). Our results indicate that each of the three behaviors is strongly predicted by its perceived effectiveness, is modestly predicted by anxiety about COVID-19 and by the social norm related to the behavior, and is weakly predicted by perceptions of the local environment (such as the belief that the number of people sick with the virus has recently increased in the respondent's local area).

Implications of Current Results for Policymakers

- Preventive behavior is predicted by the perceived effectiveness of the behaviors, anxiety about COVID-19, and perceived social norms relating to the behaviors (*descriptive norms*).
- Policy messages can harness the powerful influence of descriptive norms by publicizing widespread adoption of preventive behaviors.
- Public health and political leaders can solidify the social norms of social distancing, practicing respiratory hygiene, and mask wearing by consistently messaging that those actions are necessary and effective for controlling the spread of COVID-19.
- Although anxiety about COVID-19 predicts behavioral adherence, policymakers should be cautious about using fear messages because previous research indicates that such messages backfire if they do not also suggest actions to limit the likelihood of contracting the disease and infecting others.

Because logic suggests that social distancing behavior should reduce exposure rates, we conducted a separate analysis of how the psychological factor most predictive of this behavior—perceived effectiveness—related not only to compliance with distancing recommendations but also to reported exposures. We found that the perceived effectiveness of social distancing correlated with fewer self-reported exposures and that the link between the perception of efficacy and exposure is mediated to a great extent by practicing social distancing. The analyses we report in this article reveal correlations, not causation. But the mediation finding lends support to the intuition that belief in the preventive power of social distancing leads to reduced exposure as a result of prompting people to practice social distancing.

Our findings have important policy implications, suggesting that policymakers might increase people's compliance with recommendations to engage in social distancing, respiratory hygiene, and mask wearing by taking actions that emphasize the effectiveness of these behaviors and that establish and solidify social norms for performing them without reducing the fear of contracting and spreading COVID-19. Because successful social distancing leads to lower levels of infection in a community and may thus decrease anxiety about COVID-19, the public may be tempted to stop performing these recommended behaviors over time. Therefore, in places where infection rates decrease to low levels, policymakers may be wise to step up information campaigns that reinforce the effectiveness of the CDC's recommended behaviors and that strengthen the norms for adherence.

Methods

Participants

We recruited participants through the survey company Dynata, which hosts a nationally representative online panel. Participation was limited to U.S. citizens 18 years of age or older and fluent in English. Data collection began on April 24, 2020, with a preset target sample of 3,500 participants, and continued through May 11, 2020. A total of 41,274 individuals were invited to participate; 4,453 consented and completed the survey. Of these, 497 were excluded according to preset criteria (such as showing specific signs of inattentiveness), which left 3,956 in the final sample, a 9.6% response rate. The mean age was 48 years, 53% of participants were female, and 48% were employed. Table S1 in the Supplemental Material provides additional statistics describing the sample.

Procedure

Participants responded to 122 questions about the COVID-19 pandemic. In this article, we report on a subset of the questions that focused on three preventive behaviors recommended by the CDC: social distancing, practicing respiratory hygiene, and wearing a mask in public. For each of the questions assessing these behaviors (five questions for social distancing, three for respiratory hygiene, and one for mask wearing), participants reported their degree of behavioral compliance on a scale of 1 = *not at all* to 5 = *a great deal*. See Table S2 in the Supplemental Material for the exact questions and means.

Questions assessing the psychological processes hypothesized to influence compliance included items that measured perceptions of the efficacy of the recommended protective behaviors (such as "How effective do you think each of these behaviors is in preventing the spread of COVID-19?" [with each behavior listed separately]), anxiety about COVID-19 (such as "How worried are you about getting infected with COVID-19?"), the belief that each of the recommended behaviors have become social norms (such as "How much do you think your friends and neighbors are engaging in each of these behaviors?" [with each behavior listed separately]), personal experiences of knowing someone diagnosed with or suspected of having COVID-19, and the perception that the number of people sick with the virus had recently risen locally. Except for the personal experience questions, respondents answered all questions on a scale of 1 = *none* to 5 = either *a great deal* or *extremely*, depending on the wording of the item. The personal experience question was answered yes or no. Table S3 in the Supplemental Material lists the specific questions and the results.

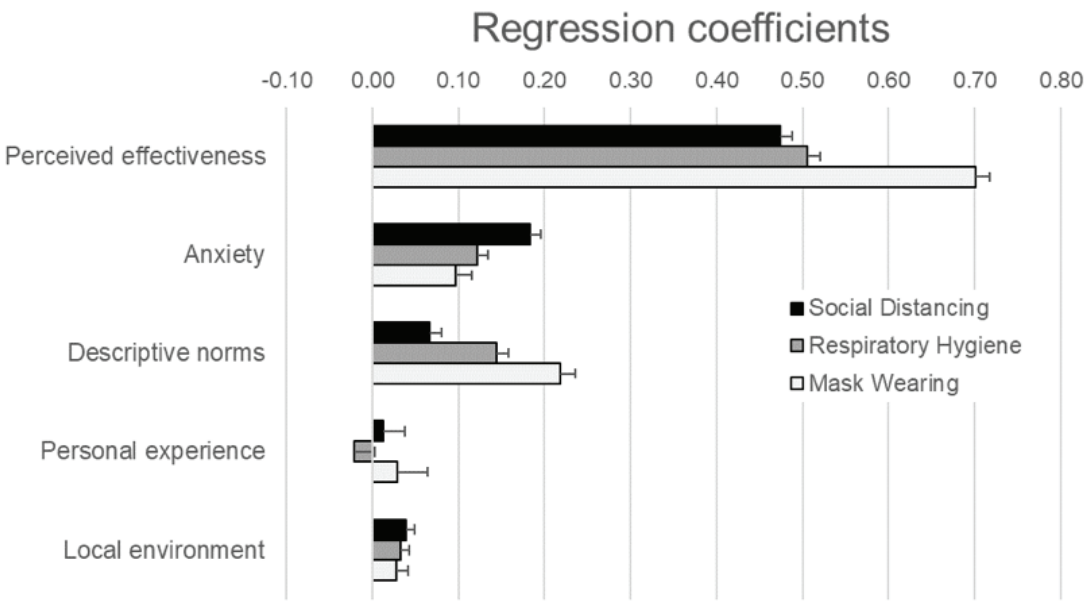
The outcomes of social distancing behavior were determined on the basis of participants' responses to open-ended questions asking for counts of the number of people (other than household members) with whom they had been in close contact, defined as being less than six feet away, even if only for a second. These numerical responses were summed to form one total of number of contacts over the past seven days. Find full details about the survey items and procedures in the Supplemental Material.

Results

Our analysis focused on self-reported measures of three behaviors: social distancing, practicing respiratory hygiene, and mask wearing. We examined five potential predictors of these preventive behaviors: perceived effectiveness, anxiety about COVID-19, perceptions of social norms, personal experience with COVID-19, and perceived prevalence of COVID-19 in the local environment.

We analyzed how strongly each of the psychological variables uniquely correlated with each preventive behavior by conducting what is known as an ordinary least squares regression analysis for each preventive behavior. Table S4 in the Supplemental Material displays the full set of findings. Each regression analysis included the five potential predictors, entered simultaneously. Figure 1 shows the relationship between each potential psychological predictor (assuming the others are fixed) and each behavior, as indicated by the regression coefficient. (For nonscientists: the larger the coefficient, the stronger the association.) Our measure of perceived effectiveness generated the largest coefficients for all three behaviors, with the strongest association seen

Figure 1. Regression coefficients indicating how strongly each of five psychological variables predicts the self-reported practicing of three behaviors meant to limit the spread of COVID-19



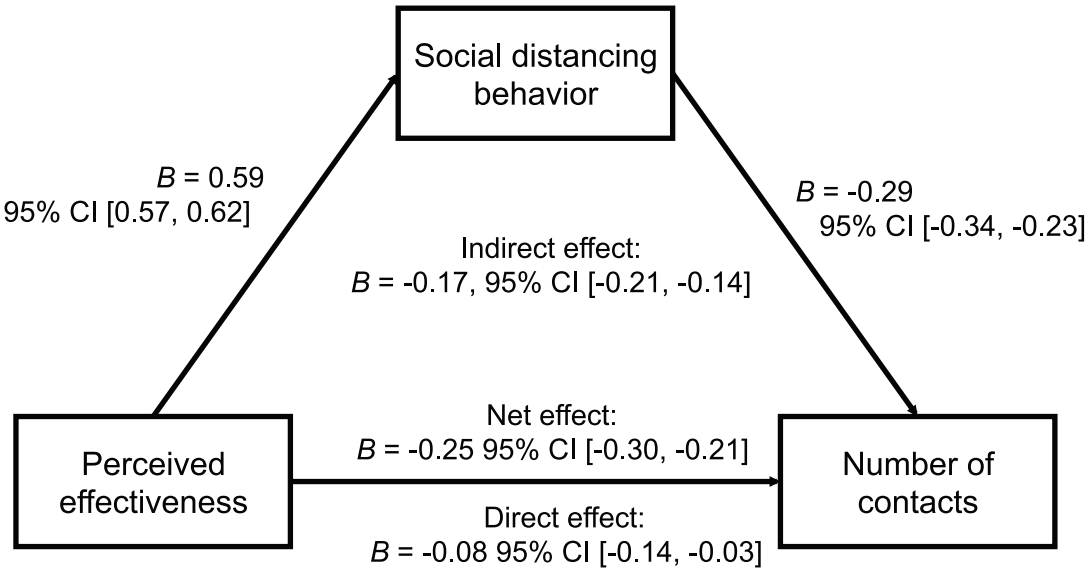
Note. For nonscientists: The regression coefficients indicate the strength and direction of the relationship between potential psychological predictors of preventive behaviors (holding all other predictors fixed) and the average self-reported practice of those behaviors. Perceived effectiveness = perceived effectiveness of the behavior; anxiety = fear of spreading or catching the disease; descriptive norms = belief that the behaviors are common practice in the general population; personal experience = having had COVID-19 or knowing someone who has been diagnosed or had major symptoms; local environment = belief that the number of people sick with COVID-19 has recently increased locally; social distancing = staying home as much as possible in the last seven days and trying to stay at least 6 feet away from other people; respiratory hygiene = engaging in behaviors such as washing hands frequently; avoiding touching the eyes, nose, and mouth; and covering a cough or sneeze with a tissue. Error bars show standard errors around the coefficients.

with mask wearing. The measures of anxiety about COVID-19 and perceptions of social norms generated the next largest coefficients. The remaining two psychological variables we examined—personal experience with COVID-19 and perceived local prevalence—generated small coefficients, with personal experience displaying no predictive power.

Because logic dictates that social distancing minimizes exposure, we decided in advance of the survey to include an analysis of the relation between exposures and the psychological factor that turned out to be most predictive of social distancing. Therefore, we next examined the relationship between the perceived effectiveness of social distancing and the number of self-reported exposures to people not in the household. We hypothesized that this relationship would be mediated by social distancing—that is, that the perceived effectiveness of social distancing would predict social distancing behavior and that the resulting social distancing would, in turn, be inversely related to the number of exposures (that is, more social distancing would be associated with less exposure).

To analyze the extent to which social distancing accounted for the influence of perceived effectiveness on exposure, we performed a mediation analysis. Finding a direct effect would imply that the perceived effectiveness of social distancing by itself predicted low exposure after the influence of engaging in social distancing was separated out. Finding an indirect effect would imply that the perceived effectiveness of social distancing predicts low exposure because perceived effectiveness also predicts social distancing behaviors. We found the latter to be the case. In the language of the field, we ran our mediation analysis[10] with 5,000 bootstrapped samples and found an indirect effect. See Figure 2.

Figure 2. Mediation analysis relating perceived effectiveness of social distancing to social distancing behavior & the number of close contacts made



Note. The plot shows that the perceived effectiveness of social distancing correlates with the number of contacts closer than six feet and that this association is mediated by social distancing behavior.

B values indicate how much a change in one variable will account for a change in the other variable and the direction of the effect; a minus sign reflects an inverse relationship. All *B* values shown are statistically significant.

CI = confidence interval. A 95% CI indicates that in 95% of random samples from a population of interest, the value that was measured will fall within the stated interval.

The importance of social distancing behavior as a mediator between perceived effectiveness of social distancing and the number of contacts is indicated by the size of the *B* value for the indirect effect and by its being larger than the B value for the direct effect (which does not take social distancing behavior into account).

We also examined whether any demographic features predicted preventive behaviors after we controlled for the contributions of the psychological predictors. Women reported higher adherence to all three behaviors than did men. Married people reported more social distancing and better respiratory hygiene than unmarried people did. White people reported worse respiratory hygiene and less mask wearing than people of color did. College-educated respondents reported more social distancing and worse respiratory hygiene than people with lower education levels did. Employed people reported less social distancing but better respiratory hygiene than unemployed individuals did. Respondents with chronic health conditions reported more social distancing and mask wearing than those without such conditions did. Higher income was associated with more social distancing and mask wearing. The more strongly respondents supported President Trump's policies and actions, the less likely they were to report social distancing and mask wearing. These results suggest that interventions to encourage preventive behavior might be especially important among some demographic groups. See Table S4 in the Supplemental Material for details.

Discussion

Our correlational analyses show that (a) the perceived effectiveness of social distancing, respiratory hygiene, or mask wearing predicts the respective behavior strongly; (b) anxiety about COVID-19 and perceptions of descriptive social norms (that is, the belief that others are routinely engaging in the preventive behaviors) predict all three of these behaviors modestly; and (c) perceptions of increases in local cases predict these behaviors only weakly.

In addition, the perceived effectiveness of social distancing predicts the level of self-reported exposure, mediated by social distancing behaviors. The results suggest the possibility that perceived effectiveness of social distancing could lead to adherence to social distancing recommendations, which in turn could lower exposure and thereby reduce the spread of disease. However, because our study was correlational and did not examine the same group of people over time, it cannot establish causation. Experimental research that manipulates the perception of efficacy is required to confirm a causal pathway to behavior.

Implications for Policy

Our survey results indicate that the perceived effectiveness of a behavior that is meant to limit the spread of COVID-19 is strongly correlated with the performance of that behavior—which might indicate that policymakers should develop better strategies for conveying these behaviors' effectiveness. Policymakers may doubt that emphasizing efficacy will help greatly, because past research relating to influenza vaccines indicates that interventions aimed at educating people about vaccine effectiveness are not among the most successful.[11] And it is conceivable that our correlational result could be explained if people who are already engaging in preventive behavior feel obliged to rate those behaviors as effective. However, the past results relating to influenza vaccines may not be directly applicable to the current situation. In particular, people have not had time to develop entrenched beliefs about which preventive approaches to COVID-19 are most effective and to thoroughly weave these attitudes into their identities. This difference from past experience may mean that preventive behaviors targeted to COVID-19 can be influenced by informational interventions in ways that behaviors related to seasonal flu shots and other vaccines are not.

How policymakers can make use of our finding of a modest tie between anxiety about catching or spreading COVID-19 and compliance behavior may also be unclear, because previous research indicates that appeals based on fear can backfire when there are no clearly effective behavioral responses.[7,12] In the absence of an available response, increased fear triggers a defensive response or avoidance of the information. Relying on the power of social norms—emphasizing that social distancing, respiratory hygiene, and mask wearing have become common practice—might be a more promising strategy. Previous literature has demonstrated that social norm manipulations can indeed promote desired behaviors.[13]

Thus, although descriptive social norms were not the strongest predictor in our study, they may be one of the more fruitful areas for intervention in the current coronavirus pandemic. Our finding of a stronger role for norms in mask wearing than in social distancing may relate to mask wearing being publicly observable, whereas staying at home is not as noticeable to others.

Although no vaccine is yet available for COVID-19, research on the psychology of vaccination sheds light on interventions that have in the past been effective at inducing people to adopt behaviors meant to protect against infectious disease.[14] Some of the most successful interventions have harnessed social norms and promoted behaviors directly without trying to change beliefs (such as by giving reminders or spelling out requirements).[15] Our results parallel that literature in pointing to the role of social norms in influencing behavior. In line with this recommendation, a finalist for a public service announcement contest in New York State emphasizes how out of place a non-mask-wearer seems when in a large group of mask-wearers.[16]

Implications for Communication Strategies

Providing the public with accurate, understandable scientific information is essential in the face of a new health risk,[17,18] such as COVID-19. Beyond providing clear facts, messaging by public figures strongly influences how people perceive the effectiveness of preventative behaviors and the strength of social norms relating to those behaviors, as well as how much anxiety people experience about catching or spreading the disease. Public figures have such a powerful influence on public perceptions because individuals often cannot themselves judge the effectiveness of preventive measures; because people differ in their firsthand experiences with COVID-19; and because views on the effectiveness of social distancing, on social norms, and on the threat posed by the disease can differ greatly across neighborhoods, cities, and countries.[19] Given that perceptions of the effectiveness of preventive behaviors can be undermined easily by incorrect or conflicting information from official sources, it is crucial that political leaders and health authorities from the national level down to the community convey accurate, consistent messages. Thus, at a time when information is changing daily and the threat is unprecedented in most people's experience, it is critical for official messages to be aligned, to clearly reflect the effectiveness of preventive behaviors in reducing the virus's spread, and to reinforce the norms for adhering to these behaviors. For example, if all public health and political leaders deliver the message that wearing masks is necessary, that consistency will reinforce the social norm of mask wearing.

Conclusion

The perceived effectiveness of behaviors meant to limit the spread of COVID-19, anxiety about the pandemic, and perceived social norms are key correlates of self-reported adherence to the preventive behaviors of social distancing, practicing respiratory hygiene, and mask wearing. Health policy interventions that provide consistent, accurate information about the level of threat and the effectiveness of recommended behaviors and that highlight high levels of adherence as the norm may be essential to maintaining the preventive behaviors over the long term and to controlling waves of new infections.

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supplemental material

- http://behavioralpolicy.org/journal
- Methods & Analysis

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