

# Factors Associated With COVID-19 Behavioral Intentions: Findings From an Online Survey

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## Abstract

**Purpose:** The COVID-19 pandemic provides a novel context through which to evaluate salient factors for promoting behavioral change. We examined how attitudes, perceived community behaviors, and prior related behaviors predict intentions to (1) receive COVID-19 vaccination and (2) practice social distancing.

**Design:** Cross-sectional online survey administered through Amazon's Mechanical Turk in September 2020.

**Subjects:** A convenience sample of US adults (N = 1804).

**Measures:** COVID-19 vaccination and social distancing intentions were measured on a 7-point Likert scale. Predictor variables included general vaccination and social distancing attitudes, perceived community mask-wearing, prior influenza vaccination, prior social distancing, and socio-demographics.

**Analysis:** Descriptive statistics and linear regressions.

**Results:** Thirty percent of respondents reported a strong willingness to receive COVID-19 vaccination, while 67% strongly intended to engage in social distancing. In regression analyses, vaccination intention was predicted by positive vaccine attitudes (b = .84; 95%CI: .78, .90; P < .001), prior influenza vaccination (b = -.47; 95%CI: -.63, -.32; P < .001), and perceived community mask-wearing (b = -.28; 95%CI: -.56, -.01; P=.049). Intention to practice social distancing was predicted by positive attitudes (b = .65; 95%CI: .61, .69; P < .001), prior social distancing (b = -.49; 95%CI: -.59, -.39; P < .001), and perceived community mask-wearing (b = -.28; 95%CI: -.46, -.09; P = .003).

**Conclusion:** Findings have implications for health promotion efforts. Messages that are targeted and tailored on pre-existing attitudes may be more effective. Additionally, leveraging prior behaviors and perceived community behavior may improve communication strategies.

## Keywords

COVID-19 vaccination, social distancing, vaccine acceptance, health communication

## Purpose

There have been significant challenges in encouraging the public to engage in preventive behavior such as vaccination and social distancing during the novel coronavirus SARS-CoV-2 (COVID-19) pandemic in the United States (US). Resistance to recommended preventive measures and limited adherence to public health guidelines in some communities have been evident throughout the public health emergency, with protests against mask mandates, COVID-19 vaccines, and social distancing orders taking place across the country. Further challenging pandemic control efforts has been the stark politicization of COVID-19, dividing those who are engaging in recommended protocols and those who are not by

political viewpoints as well as location.<sup>1,2</sup> Those living in rural areas are less likely to engage in protective behaviors such as COVID-19 vaccination yet have less access to sufficiently

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equipped facilities to handle surges in infection. Further, rural residents tend to be older and have comorbidities that increase risk of hospitalization and COVID-19–related complications.<sup>3,4</sup>

To complicate matters, COVID-19 safety guidelines and communication have varied across states, counties, and municipalities, adding further challenges to public health communication efforts.<sup>5</sup> The multiple shifts in policies across jurisdictions and abundance of pandemic-related information, some of which was conflicting, may have overwhelmed or confused individuals, and contributed to distrust in public health institutions.<sup>6</sup> A poll published in May 2021 indicated that only 52% of Americans have a great deal of trust in the Centers for Disease Control and Prevention (CDC), and trust in other federal health agencies was even lower,<sup>7</sup> signaling another hurdle for pandemic control efforts. Additionally, the proliferation of health information online, including the spread of misinformation, exacerbates existing reluctance to engage in preventive behaviors.<sup>8,9</sup> Furthermore, vaccine hesitancy has undermined efforts to control the pandemic. As of February 2022, an estimated 73% of US adults have been vaccinated against SARS-CoV-2, 4% remain in the “wait and see” category and 16% refuse to vaccinate.<sup>10</sup> To counter the challenges highlighted above, a top public health priority is the development and dissemination of effective health communication efforts and resonant messages that align with the information needs of the audience to promote vaccination, social distancing, and other COVID-19 preventive behaviors.<sup>11</sup>

Prior research in health communication has demonstrated the utility of message *targeting*, referring to messages that are customized for a group based on shared characteristics (e.g., gender or other demographics), and *tailoring*, wherein messages are personalized to a specific individual’s traits,<sup>12</sup> as effective health communication strategies<sup>13–15</sup> and may inform communication efforts to promote COVID-19 preventive behaviors. In particular, drawing on concepts from cultural tailoring literature (e.g., surface and deeper-level tailoring) may help inform health communication approaches.<sup>16</sup> Surface-level tailoring entails incorporating elements such as the use of racially concordant individuals, native language messaging, or linguistically appropriate content in messages. Deeper-level tailoring speaks to message salience and how “ethnic, cultural, social, environmental, and historical factors may influence specific health behaviors”.<sup>16</sup> Although both surface and deep-level tailoring strategies are effective, a recent meta-analysis found that deep tailoring to values and norms in persuasive cancer messages demonstrated stronger effects in comparison to surface-level tailoring (e.g., language and appearance),<sup>17</sup> which may have implications for COVID-19 messages. Applying the concept of deeper-level tailoring from cultural tailoring literature could be a promising strategy in COVID-19 communication. Some deeper-level factors have not been well explored in health behavior research, such as perceived community behavior related to mask-wearing and prior related health behaviors on the receptivity of persuasive messages regarding COVID-19 preventive behaviors.

Theories, such as the Theory of Planned Behavior (TPB),<sup>18</sup> have assisted our understanding of how factors such as attitudes and norms shape preventive behaviors such as mask-wearing or social distancing.<sup>19,20</sup> In contrast, little attention has been given to how constructs such as attitudes, perceived community behavior (e.g., mask-wearing), and prior related behavior taken together may contribute to intentions towards multiple behaviors related to COVID-19 control, including COVID-19 vaccination and social distancing. There is a need to understand the role of these constructs and how they might collectively influence behaviors within the novel pandemic context. To that end, using data from an online study conducted with a convenience sample of respondents in the fall of 2020, our analysis aims to assess how deeper-level factors such as attitudes about COVID-19 vaccination and social distancing, perceived community mask-wearing, and prior related behaviors (e.g., influenza vaccination, prior social distancing), predict COVID-19 vaccination and social distancing intentions. Findings may help identify salient factors that messages could be tailored on in order to increase message effectiveness and receptivity and promote COVID-19 preventive behaviors.

## Methods

### Design

This cross-sectional study, which investigates predictors of intention to receive a COVID-19 vaccine and engage in social distancing, emerged from a larger experimental study examining the effect of narrative vs non-narrative messages on COVID-19 behavioral intentions among US adults.<sup>21</sup> In the parent study, consenting participants completed a questionnaire asking about COVID-19 experiences, behaviors, attitudes, and intentions prior to message exposure. They were then randomly assigned to view three narrative or non-narrative messages about a set of prominent COVID-19 topics: social distancing, vaccination, and use of unproven experimental treatments. After message exposure, participants again reported their attitudes and intentions to engage in COVID-19–related behaviors. The current analysis is based only on the survey completed by participants prior to message exposure as well as the sociodemographic questionnaire completed at the end of the study. After providing written consent, participants received access to the online survey. Participants received an incentive of \$2 upon completion of the study. All procedures were reviewed and approved by the internal review board at the National Cancer Institute.

### Sample

A convenience sample of 1804 US adults were recruited in September 2020 via Amazon Mechanical Turk (MTurk), a crowdsourcing site that allows individuals to complete web-based surveys for monetary compensation. Although

MTurk allows for rapid and cost-effective recruitment of participants, samples tend to be younger, more educated, and more liberal than the general population, which can introduce bias and has implications for generalizability.<sup>22</sup>

## Measures

To better understand the role of attitudes, perceived community mask-wearing, and prior related behaviors, on COVID-19 vaccination and social distancing intentions, we included available measures from the parent study that were specifically related to vaccine and social distancing (e.g., attitudes related to preventive COVID-19 behaviors, perceived community mask-wearing, and prior behavior such as influenza vaccination receipt and prior social distancing). The instrument questions were drawn from several prominent COVID-19–related national surveys and modified for the purposes of the current study<sup>23,24</sup>. The two outcome measures were intention to receive COVID-19 vaccination and intention to engage in social distancing. COVID-19 vaccination intention was measured using a single item, “If a vaccine to prevent COVID-19 were widely available today, would you...” with responses ranging from “definitely not get the vaccine” (1) to “definitely get the vaccine” (7). Intention to engage in social distancing was measured with the item “To what extent do you agree or disagree with this statement? I plan to engage in social distancing in the next 7 days.” with responses ranging from “strongly disagree” (1) to “strongly agree” (7).

In terms of predictor variables, general vaccine attitudes were captured using the mean of the following three items: “Overall I think vaccines are safe,” “Overall I think vaccines are effective,” “Being vaccinated is important to protect the health of others.” Responses ranged from “strongly disagree” (1) to “strongly agree” (7). Cronbach’s alpha was 0.94, demonstrating high internal consistency. Social distancing attitudes were measured with the following item: “To what extent do you agree or disagree with the following statement? Social distancing is an effective measure against the spread of the coronavirus,” with responses ranging from “strongly disagree” (1) to “strongly agree” (7).

Participants’ perceived community behavior around COVID-19 preventive behavior (i.e., mask-wearing) was assessed with one item that asked, “How often do people in your community currently wear a mask or any face covering when they go to public places?”; response options ranged from “never” to “all or most of the time.” Prior related behaviors were measured by asking about past-year influenza vaccination and prior social distancing. Influenza vaccination was assessed with the following item: “Have you had a flu vaccination in the past 12 months?” (yes/no). Previous social distancing behavior was measured with four items: participants indicated if they had done, had considered doing, or had not done any of the following in the past 7 days: “Avoided going to public places, such as restaurants,” “Avoided small

gatherings of people, such as with family or friends,” “Avoided traveling by airplane, bus, subway, or train,” and “Worn a mask on your face when outside your home.” Based on the distribution of responses, which indicated that most participants had engaged in all four of the social distancing behaviors, responses were dichotomized into those who had engaged in all four activities and those who had not or had only engaged in some social distancing.

Sociodemographic covariates were self-reported and included age (18–34, 35–49, 50–65, and 65+), gender (female, male, and other), race/ethnicity (Hispanic, non-Hispanic Black, Asian, non-Hispanic White, and other), highest level of education (less than college, college graduate, or higher), residence (city/suburb and rural/small town), and political viewpoint (liberal, moderate, and conservative).

## Analysis

Correlations between COVID-19 vaccination intention and general vaccine attitudes, perceived community mask-wearing, and prior influenza vaccination were examined; as were correlations between social distancing intentions and social distancing attitudes, perceived community mask-wearing, and prior social distancing. Two separate multiple linear regressions were used to identify predictors of COVID-19 behavioral intentions related to (1) COVID-19 vaccination and (2) social distancing. The models included attitudes, prior related behavior, and perceived community mask-wearing, and controlled for sociodemographic covariates (i.e., age, gender, race/ethnicity, education, residence, and political viewpoint). Significance was set at the .05 level. All analyses were conducted using Stata 16.1.

## Results

### Sample Characteristics

In the study sample (N = 1804), 51.5% of respondents were male, 43.0% were 18–34 years old, and 62.0% had at least a college or higher level of education. Most respondents were non-Hispanic White (73.6%) and lived in a city or nearby suburb (65.5%). A little over half (53.2%) identified as liberal, 20.3% as moderate, and 26.5% as conservative (Table 1). In terms of prior related behaviors, 43% of the sample had received an influenza vaccine in the past 12 months, 62.9% reported engaging in social distancing measures, and 52.4% reported that members in their community wore masks most or all of the time.

Thirty percent of respondents reported that they would receive a COVID-19 vaccine if it was available (mean = 4.91, standard deviation = .05) (Figure 1), whereas 67% of respondents strongly agreed that they planned to engage in social distancing in the next 7 days (mean = 6.26, standard deviation = .03) (Figure 2).

**Table 1.** Study Sample Characteristics (N = 1804).

Characteristic	N	%
Gender		
Male	929	51.5
Female	864	47.9
Other	11	0.6
Age		
18–34	776	43.0
35–49	680	37.7
50–65	285	15.8
Over 65	63	3.5
Race/ethnicity		
Non-Hispanic White	1328	73.6
Non-Hispanic Black	156	8.7
Asian	157	8.7
Hispanic	122	6.8
Other	41	2.3
Education		
College or higher	1118	62.0
Less than college	686	38.0
Political viewpoint		
Liberal	958	53.2
Moderate	366	20.3
Conservative	478	26.5
Residence		
Urban/suburb	1181	65.5
Rural/small town	623	34.5
Received influenza vaccine		
Did not receive influenza vaccine	1021	57.4
Received influenza vaccine	759	42.6
Previous social distancing		
Engaged in social distancing	1134	62.9
Did not engage in social distancing	670	37.1
Perceived community mask-wearing		
All or most of the time	945	52.4
Sometimes	718	39.8
Occasionally or never	140	7.8

## Regression Analyses

The regression analysis for COVID-19 vaccination intentions found that more positive attitudes toward vaccines in general were associated with higher intention to be vaccinated ( $b = .84$ ; 95%CI: .78, .90;  $P < .001$ ). In contrast, living in a community where people did not wear masks regularly ( $b = -.28$ ; 95%CI:  $-.56, -.01$ ;  $P = .049$ ) and not having received an influenza vaccination in the past 12 months ( $b = -.47$ ; 95%CI:  $-.63, -.32$ ;  $P < .001$ ) were negatively associated with vaccination intentions. Living in a rural area or small town ( $b = -.32$ ; 95%CI:  $-.47, -.16$ ;  $P < .001$ ), being African American ( $b = -.59$ ; 95%CI:  $-.84, -.32$ ;  $P < .001$ ), being female ( $b = -.40$ ; 95%CI:  $-.55, -.26$ ;  $P < .001$ ), and identifying as conservative ( $b = -.27$ ; 95%CI:  $-.44, -.09$ ;  $P = .003$ ) were also negatively associated with intention to receive a vaccine (Table 2).

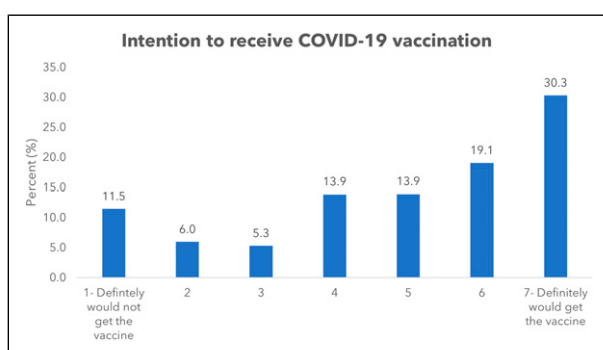
Findings from the regression model for social distancing intentions revealed that respondents who had more positive social distancing attitudes ( $b = .65$ ; 95%CI: .61, .69;  $P < .001$ ) had greater intentions to engage in social distancing. Those who lived in a community where people did not wear masks regularly ( $b = -.28$ ; 95%CI:  $-.46, -.09$ ;  $P = .003$ ) and those who had not previously engaged in social distancing ( $b = -.49$ ; 95%CI:  $-.59, -.39$ ;  $P < .001$ ) had lower intentions to engage in social distancing. Females ( $b = -.10$ ; 95%CI:  $-.19, -.01$ ;  $P = .04$ ) and those who identified as conservative ( $b = -.24$ ; 95%CI:  $-.36, -.12$ ;  $P < .001$ ) also had significantly lower intentions to engage in social distancing (Table 3).

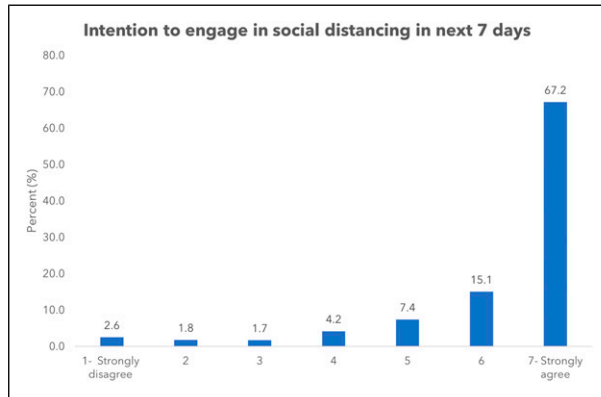
## Discussion

The COVID-19 pandemic has demonstrated the enormous challenges in ensuring the public's adherence to recommended health behaviors, highlighting the need to develop effective health promotion approaches. Towards this goal, this study assessed predictors of intentions to engage in two important behaviors, namely, vaccination and social distancing. For both COVID-19 preventive behaviors, findings demonstrate the critical need for ongoing, relevant communication informed by deeper-level constructs such as attitudes towards the behaviors, in line with previous research.<sup>25</sup> Additionally, we found that other deeper-level factors such as perceived community mask-wearing and prior related behavior were also associated with behavioral intentions.

### Perceived Community Mask-Wearing

Living in a community where protective behavior (e.g., mask-wearing), was the perceived norm predicted intention to receive COVID-19 vaccination and engage in social distancing; this finding has implications for communication efforts. When engaging with communities where COVID-19 preventive behaviors are considered normative, health messages may

**Figure 1.** COVID-19 vaccination intentions.



**Figure 2.** Social distancing intentions.

simply reinforce these behaviors. When communicating with communities where protective behaviors are not the norm, messages may need to further align with individuals' values and priorities. Indeed, literature shows that framing COVID-19 messages around values might be effective in increasing intention to practice preventive behaviors.<sup>26,27</sup> For example, promoting social distancing as a helpful and prosocial behavior that protects loved ones may be more effective, particularly for audiences that are known to be more receptive to prosocial messages.<sup>28,29</sup> In another study, prosocial framing (e.g., “don’t spread it”) was more effective in promoting preventive behaviors than self-interested messages (e.g., “don’t get it”).<sup>30</sup> Establishing these evidence-based protective behaviors as the default and normative, accompanied by facilitating access to these behaviors (e.g., vaccination services and environments that facilitate social distancing) may collectively encourage engagement in such behaviors.

### Prior Related Behavior

In line with previous research,<sup>31</sup> the current analysis also identified prior related behaviors as being associated with intentions to engage in COVID-19 preventive behaviors. In particular, the association between prior influenza vaccination and intentions to receive COVID-19 vaccination is worth noting: those who reported having received an influenza vaccination previously were more likely to report intention to receive a COVID-19 vaccination. Healthcare providers (e.g., physicians, pharmacists, and nurses), health agencies, and insurance payers may consider targeting vaccine communication to their patients by accounting for their previous influenza vaccination. Tailored messages that reference related behavior (e.g., “just like your last flu shot, here’s a shot to reduce your risk of getting sick from COVID-19”) may reduce message resistance especially in those who have accepted such behaviors. Moreover, healthcare providers may present COVID-19 vaccine recommendations bundled with other vaccines (e.g., influenza vaccine) during conversations with

patients. Given that providers are often regarded as a trusted source of information and their recommendation is one of the strongest predictors of vaccination,<sup>32</sup> they are uniquely positioned to allay COVID-19 concerns, foster trust in vaccine science, and encourage COVID-19 health-promoting behaviors. For example, providers can highlight the vaccine’s rigorous testing and the inclusion of diverse participants in the vaccine trials as a promising strategy to reduce hesitancy.<sup>10</sup>

### Attitudes

Not surprisingly, favorable attitudes towards vaccination and social distancing in general were significantly associated with related intentions. This suggests a greater need for audience segmentation and targeted communication—specifically, developing messages that are targeted and tailored on the audience’s pre-existing attitudes, if available, may increase message acceptance. For example, for those who may be hesitant about vaccination, deep tailored (e.g., to their negative attitudes, concerns over safety or freedom, or doubts about efficacy of vaccines) messages would highlight COVID-19 safety and effectiveness, transparency of vaccine science (e.g., by sharing details on the vaccine development process), and may debunk prominent myths and rumors. Transparency is particularly relevant for building trust and confidence in vaccination. Offering information on the ongoing process used to monitor vaccine safety may alleviate concerns and garner more favorable vaccine attitudes.

As observed in our findings, self-reported political viewpoint was significantly associated with COVID-19 behavioral intentions, with self-identified conservatives reporting lower intentions to vaccinate or engage in social distancing. Also related to the concept of deep tailoring, public health communication strategies may be made more effective by appealing to particular ideological or political views of the audience, such as taking protective measures to mitigate the threat of the pandemic on the economy.<sup>33</sup> Prior research indicates that those who identified as conservative reported lower intentions to engage in preventive behaviors, which may be due to the politicization of the pandemic. Self-described conservatives also reported lower risk perception of COVID-19 than their liberal counterparts.<sup>34,35</sup> Furthermore, media coverage of the pandemic differs greatly between media outlets, which may be perpetuating existing divisions and differences in attitudes towards COVID-19 guidelines.<sup>36</sup> In addition to communication targeted and tailored to political viewpoints and unique concerns, having vaccination endorsements from popular and trusted public figures or respected community leaders may help to convey a sense of unity across political viewpoints and sociodemographic groups and inspire confidence in COVID-19 preventive behaviors.<sup>33,37</sup>

In concert with deep tailoring on norms, beliefs, and values, surface tailoring on select sociodemographic factors may also be beneficial to increasing message receptivity. Our findings indicated lower vaccination intentions among females, rural

**Table 2.** Regression Models for COVID-19 Vaccination Intentions.

COVID-19 Vaccination intention	Coefficient	Standard error	95%CI	P-value
General vaccine attitudes	.84	.03	.78, .90	.00
Community members wear masks (ref: always or often)				
Sometimes	-.02	.08	-.17, .13	.82
Not often/never	-.28	.14	-.56, -.01	.049
Received flu shot in past season (ref: yes)				
No	-.47	.08	-.63, -.32	.00
Residence (ref: urban area)				
Rural/small town	-.32	.08	-.47, -.16	.00
Race/ethnicity (ref: Non-Hispanic White)				
Non-Hispanic Black	-.59	.13	-.84, -.32	.00
Asian	.21	.13	-.30, .03	.08
Hispanic	.09	.15	-.34, .03	.60
Other	.09	.25	-.22, .40	.79
Gender (ref: male)				
Female	-.40	.07	-.55, -.26	.00
Other	.03	.46	-.87, .93	.95
Age (ref: 65+)				
18-34	-.03	.20	-.43, .36	.88
35-49	-.11	.20	-.52, .28	.56
50-65	-.13	.21	-.56, .28	.54
Education (ref: college graduate or higher)				
Less than college	-.03	.08	-.17, .13	.79
Political viewpoint (ref: liberal)				
Moderate	-.19	.10	-.38, .00	.05
Conservative	-.27	.09	-.44, -.09	.003

populations, conservatives, and Black adults. In response, vaccination communication efforts may bolster message appeal by including spokespersons that reflect individuals from these groups. For example, targeted and tailored communication to appeal to Black adults may more effectively reach these populations than broader national campaigns. As another example, more robust engagement with rural communities who have lower vaccination intentions is needed that addresses their concerns, such as concerns of long-term effects of COVID-19 vaccination or some people's pre-existing vaccine hesitancy.<sup>38,39</sup>

In addition to public health messages, we need to provide support to facilitate vaccination and social distancing. There is a need to consider and support those who face challenges in practicing social distancing such as frontline and essential workers, individuals who lack childcare, and those with housing issues or crowded living situations. Messages may not be sufficient without logistical and material supports that enable these preventive behaviors.

Our findings have implications for future public health emergencies and associated preventive measures. As suggested by our study finding on related prior behaviors, future preventive behavioral intentions will likely be influenced by current attitudes and behaviors. Thus, assessing population-level baseline attitudes and other salient factors and integrating

such information into message design and targeting and tailoring efforts on surface and deeper-level factors can help make public health efforts more effective.

### Limitations and Future Directions

There are several limitations to this study. Although we were able to examine predictors of intention, other potentially important factors, such as performance of behaviors or perceived behavioral control, were not measured. Further, the measure of perceived community behavior was related to mask-wearing and hence a proxy for preventive behavior and not specific to vaccination or social distancing. Survey items also did not include factors such as cost, access issues, and other potential barriers to vaccination. Another important limitation was the reliance on self-reported measures, which can introduce bias or measurement errors. Respondents may have felt compelled to answer questions in a socially desirable manner given the policies mandating social distancing during the pandemic. Additionally, data collected using MTurk were from users of this platform and not representative of the US population.<sup>22</sup> In particular, respondents in our sample had higher levels of education than the overall population, largely lived in urban areas, and had higher self-reported rates of being liberal. Further, there

**Table 3.** Regression Models For Social Distancing Intentions.

Social distancing intention	Coefficient	Standard error	95%CI	P-value
Social distancing attitudes	.65	.02	.61, .69	.00
Community members wear masks (ref: always or often)				
Sometimes	−.10	.05	−.20, −.01	.07
Not often/never	−.28	.09	−.46, −.09	.003
Engaged in social distancing behaviors (ref: engaged in social distancing)				
Have not/somewhat engaged in social distancing	−.49	.05	−.59, −.39	.00
Residence (ref: urban area)				
Rural/small town	.07	.05	−.03, .18	.16
Race/ethnicity (ref: Non-Hispanic White)				
Non-Hispanic Black	−.02	.09	−.19, .16	.99
Asian	−.13	.09	−.30, .04	.14
Hispanic	−.09	.10	−.28, .10	.35
Other	.09	.16	−.22, .41	.56
Gender (ref: male)				
Female	−.10	.05	−.19, −.01	.04
Other	.32	.31	−.29, .92	.29
Age (ref: >65)				
18–34	.06	.13	−.20, .32	.66
35–49	.12	.13	−.15, .38	.38
50–65	.21	.14	−.07, .49	.13
Education (ref: college graduate or higher)				
Less than college	−.05	.05	−.15, .05	.24
Political viewpoint (ref: liberal)				
Moderate	.00	.06	−.12, .13	.99
Conservative	−.24	.06	−.36, −.12	.00

have been several notable milestones since data collection in the fall of 2020, such as the approval and distribution of several COVID-19 vaccines as well as changes to social distancing and mask-wearing guidance. While we were able to assess differences by rural vs urban residence, which is important given lower access to care resources and lower likelihood of engaging in protective behaviors among rural residents, we were limited in our ability to analyze the influence of other aspects related to geography. Future research would benefit from collecting granular place-based data (e.g., county-level data), particularly given the variation in pandemic policies by jurisdiction and its subsequent influence on behavior and decision-making.

Nonetheless, continued research to inform efforts to effectively promote vaccination and social distancing remain critical, especially given the ongoing evolution of the virus. Vaccination rates have plateaued and there have been reinstatements of social distancing and masking guidelines and recommendations of booster vaccines in response to viral variants, highlighting the need for continued critical preventative measures.<sup>10,40</sup> Currently, most COVID-19-related hospitalizations and deaths are among the unvaccinated, underscoring the importance of promoting protective behaviors to reduce risk of severe disease and avoid preventable COVID-19 morbidity and mortality. Thus, it is to our benefit to continue to emphasize the safety, effectiveness, and

importance of preventive measures via targeted and tailored messages with the aim of increasing message receptivity and promoting protective behaviors.

Given the limited sample size and issues with generalizability in the current study, future research should utilize nationally representative data to identify predictors of COVID-19-related behavioral intentions and actual behaviors on a population level. Research examining the factors identified in the current study outside the US context (where social norms and political environments differ and availability of vaccines varies) could also be informative. Inclusion of constructs such as self-efficacy in engaging in preventive behaviors, emotional predictors of behavior, and trust in the government or other entities in future studies could also help us better understand acceptability of preventive behaviors. COVID-19 knowledge and guidelines evolve rapidly and often, necessitating further research on the influence of COVID-19 knowledge on perceptions and behavior. Longitudinal studies can elucidate changes in attitudes, norms, and intentions among individuals over time.

## Conclusion

Controlling the COVID-19 pandemic is dependent on compliance with public health recommendations and uptake of

protective behaviors such as COVID-19 vaccination and social distancing. Understanding deeper-level determinants of behavioral intentions such as attitudes, prior related behaviors, perceived community behavior, and sociodemographic factors is important for developing effective strategies to encourage protective behaviors and reduce risk of transmission and severe disease.

## So What?

### What Is Already Known On This Topic?

There have been significant challenges in promoting COVID-19 preventive behaviors to the public. Effective communication encouraging vaccine uptake and social distancing can promote adherence to protective behaviors and curb virus transmission. Extant social and behavioral science research has investigated factors contributing to adherence to recommended preventive behaviors.

### What Does This Article Add?

Drawing from health communication literature on message targeting and tailoring, this study examines the influence of deeper-level factors such as attitudes, perceived community behavior, and prior related behavior during a novel pandemic context. Findings highlighted the association between attitudes, perceived community mask-wearing, prior related behavior (influenza vaccination or social distancing), and intentions to receive COVID-19 vaccination and engage in social distancing.

### What Are the Implications For Health Promotion Research or Practice?

Findings may inform the development of tailored health messages aimed at increasing message receptivity and effectiveness and promoting COVID-19 preventive behaviors.

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## Authors' contributions

All the authors made significant contributions to the study and development of the manuscript. YL performed the statistical analysis, interpreted the data, drafted, and revised the manuscript. AB, AG, II, and SC interpreted the data, critically reviewed, and revised the manuscript. All authors approved the manuscript as submitted.

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## Disclaimer

The opinions expressed by the authors are their own and the research presented in this paper should not be interpreted as representing the official viewpoint of the U.S. Department of Health and Human Services, the National Institutes of Health or the National Cancer Institute.

## Ethics statement

This study was reviewed by the National Institutes of Health (NIH) Office of IRB Operations (IRBO) which determined that the human subject research activities proposed meet the federal criteria for the following exemption category: Category (2) Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (§45 CFR 46.104(d)(2)) (IRB #000117).

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