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# THE COVID STATES PROJECT: A 50-STATE COVID-19 SURVEY

## REPORT #36: EVALUATION OF COVID-19 VACCINE COMMUNICATION STRATEGIES

USA, January 2021

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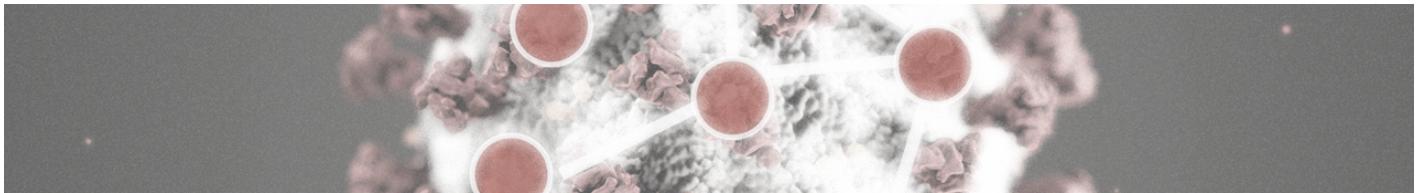
HARVARD  
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## Report of January 25, 2021, v.1

### ***The COVID States Project***

**From:** The COVID-19 Consortium for Understanding the Public's Policy Preferences Across States

#### **A joint project of:**

Northeastern University, Harvard University, Rutgers University, and Northwestern University

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Northeastern University

*Network Science Institute*



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## **COVER MEMO**

### **Summary Memo — January 25, 2020**

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From April 2020 through January 2021, we conducted multiple waves of a large, 50-state survey, some results of which are presented here. You can find previous reports online at [covidstates.org](https://covidstates.org).

#### **Note on methods:**

Between December 16, 2020 and January 11, 2021, we surveyed 25,640 individuals across all 50 states plus the District of Columbia. The survey was conducted by PureSpectrum via an online, nonprobability sample, with state-level representative quotas for race/ethnicity, age, and gender (for methodological details on the other waves, see [covidstates.org](https://covidstates.org)). In addition to balancing on these dimensions, we reweighted our data using demographic characteristics to match the U.S. population with respect to race/ethnicity, age, gender, education, and living in urban, suburban, or rural areas. This was the latest in a series of surveys we have been conducting since April 2020, examining attitudes and behaviors regarding COVID-19 in the United States.

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# Evaluation of COVID-19 vaccine communication strategies

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This report outlines the current state of COVID-19 vaccine hesitancy (defined as preferring to delay vaccination) and resistance (defined as not wanting to take the vaccine at any point), as well as the results from two experiments designed to test strategies for increasing Americans' willingness to take the vaccine when it's available to them.

## Executive summary

We evaluate the results of two experiments testing different communication strategies to increase people's willingness to take the COVID-19 vaccine. Key findings are that a variety of *messages* are effective for reducing vaccine hesitancy and resistance, while *messengers* are less effective and – in the case of partisan messengers – have the potential to *increase* resistance among political out-groups. The most effective strategies evoked scientists and people's own doctors as endorsers of vaccination. We found, also, that messages evoking harm reduction and "people you know" were more effective in counties where the virus is spreading more quickly.

## Introduction

A successful vaccination campaign against SARS-CoV2 requires a sufficient share of the public to be willing to be vaccinated. This in turn requires an effective communications strategy. Here we evaluate multiple possible approaches by exposing survey respondents to varying messages (that is, reasons to be vaccinated) and messengers (that is, prominent individuals publicly getting vaccinated).

We present results from two experiments pertaining to willingness to take the COVID-19 vaccine that were embedded in the December/January wave of the COVID States survey, as well as additional descriptive results regarding vaccine attitudes and beliefs. We collected data from 24,682 people between December 16, 2020 and January 10, 2021. For all descriptive analyses, we apply survey weights using national benchmarks for race, gender, age, education, Census region, and urbanicity. (Note: experimental analyses do not use these survey weights.) The experiments involved randomly varying the content of verbal vignettes, and then asking people about their willingness to be vaccinated after reading the vignette. One experiment broadly concerned *messages* (reasons for taking the vaccine), while the other broadly concerned *messengers* (who is taking the vaccine).

## Experimental Design

In the *message* experiment, we randomly presented respondents with one of five rationales for getting vaccinated, such as “patriotic duty” or an endorsement from one’s personal physician. As a guide in selecting the messages, we relied upon the academic literature on science communication (see Appendix for a selection of relevant further reading). We compare respondents’ subsequent self-reports of their likelihood to get vaccinated against responses from a control condition, in which respondents were asked about their intent to get vaccinated, without reading any prior rationale for doing so. The specific question wording was as follows:

**There is some debate about taking the COVID-19 vaccine. [MESSAGE TEXT]**

Randomize message text:

1. How likely are you to get vaccinated? (Control)
2. Many argue that it is a matter of **patriotism and doing what is right** for the country. With that in mind, how likely are you to get vaccinated?
3. Many argue that it is a matter of **preventing harm to yourself and others**. With that in mind, how likely are you to get vaccinated?
4. If you learned that **most people you know said they were likely to take the vaccine**, what would you think? How likely would you be to get vaccinated?
5. If you learned that **most scientists recommended taking the vaccine**, what would you think? How likely would you be to get vaccinated?
6. If you learned that **your personal physician recommended taking the vaccine**, what would you think? How likely would you be to get vaccinated?

For the *messenger experiment*, we consider six comparisons to a control condition, which also asked respondents how likely they were to get a COVID-19 vaccine, with no additional information. Three treatment conditions concern specific public figures: Donald Trump, Barack Obama, and Anthony Fauci. The other three were more flexible, first asking the respondent at the beginning of the survey to write down their favorite politician, athlete, or celebrity, and then presenting the respondents’ answers to them as the person being vaccinated in the treatment condition. The most common politicians mentioned were Donald Trump and Joe Biden; the most common athletes mentioned were Michael Jordan, LeBron James, and Tom Brady; the most common celebrities mentioned were Tom Hanks, Johnny Depp, and Adam Sandler (though there was more variation in celebrities mentioned than in politicians and athletes).

In addition, treated respondents in this experiment were also randomized into being asked to consider their reaction if the person in question announced they were vaccinated or were vaccinated on live television. The specific question wording is as follows:

**How likely are you to get a COVID-19 vaccine if [SOURCE] [MESSAGE]**

CONTROL: How likely are you to get a COVID-19 vaccine?

[SOURCE]:

1. [FAVORITE POLITICIAN]
2. [FAVORITE ATHLETE]
3. [FAVORITE CELEBRITY]
4. Anthony Fauci
5. Donald Trump
6. Barack Obama

[MESSAGE]:

1. were to announce they got vaccinated
2. were vaccinated on TV

In both experiments, respondents reported their likelihood of getting vaccinated on a seven-point scale ranging from extremely unlikely to extremely likely.

## Vaccine Hesitancy vs. Vaccine Resistance

We consider two overlapping outcomes based on respondents' reported likelihood of getting vaccinated: average likelihood of taking the vaccine – with responses ranging from extremely unlikely to extremely likely – and the share of respondents who are classified as "resistant" to taking the vaccine. Respondents are defined as "resistant" only if they say they are "extremely unlikely" to take the vaccine. We consider both of these outcomes because they represent distinct types of responses to vaccine uptake.

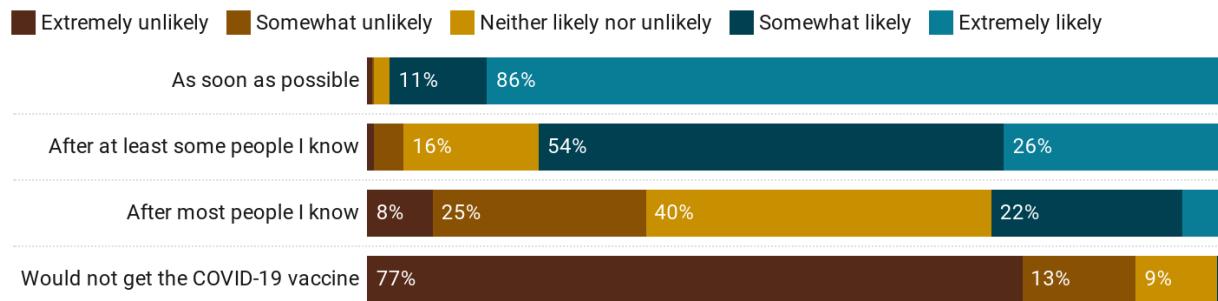
This is shown in Figure 1, which examines the relationship between responses to a likelihood question and responses to a second question asking *when* respondents would choose to receive the vaccine – both of which were asked earlier in the survey prior to the experimental conditions. As [other survey researchers have found](#), and as our results show, respondents who indicate they are somewhat unlikely to take the COVID-19 vaccine are often merely "hesitant," as opposed to "resistant." **When people indicate that they are only somewhat likely or unlikely to take the vaccine, they often mean that they would prefer to wait until other people have taken the vaccine before they take it themselves.** We consider this vaccine "hesitance."

Conversely, 91% of those who say they are “extremely unlikely” to take the vaccine also indicate that, if given a choice of when to take the COVID-19 vaccine, they would not do so at any point. We consider this attitude vaccine “resistance.” The analyses in subsequent sections consider both overall likelihood of vaccination (i.e., the 1 to 7 response in the experimental conditions) and resistance to getting vaccinated (i.e., whether or not the response is “extremely unlikely”).

## Vaccination timing and likelihood of getting a COVID-19 vaccine

**Rows by vaccine timing:** If you were able to choose when to get a COVID-19 vaccine, would you get it...?

**Percent by likelihood:** If a COVID-19 vaccine was available to you, how likely would you be to get vaccinated?



National sample, N = 25,640, Time period: 12/16/2020-01/10/2021

Source: The COVID-19 Consortium for Understanding the Public’s Policy Preferences Across States (A joint project of: Northeastern University, Harvard University, Rutgers University, and Northwestern University) [www.covidstates.org](http://www.covidstates.org)

• Created with Datawrapper

**Figure 1: Vaccine timing preferences and likelihood.** Each stacked bar represents preferred vaccination timing; the segments comprising the stacks represent reported vaccination likelihood among those with that preferred vaccination timing.

In Tables 1-4, we present brief demographic overviews of respondents who are enthusiastic (saying they prefer to be vaccinated as soon as possible), hesitant (saying they prefer to be vaccinated after some or most people they know have already received it), and resistant (saying they would not get the vaccine at any point).

Consistent with [prior findings](#) in vaccine attitudes, resistance is higher among Black respondents (as well as respondents in other racial minority groups) than among white, Latino, and Asian respondents (Table 1). With respect to age (Table 2), resistance is lowest among seniors. Young adults (18-24 year olds) are most hesitant and somewhat resistant, though these responses could reflect knowledge that they are at lower risk from COVID-19 symptoms and thus are at lower priority for getting vaccinated. The highest share of resistant respondents are in the 25-44 age group. Consistent with [previous surveys](#), we also find that men (Table 3) and Democrats (Table 4) report higher rates of enthusiasm/lower rates of resistance toward taking the COVID-19 vaccine than their respective female and Republican/Independent counterparts.

Table 1: Vaccine Timing Preferences by Race

Race	Already	ASAP	Hesitant	Resistant
<b>White</b>	0.027	0.362	0.383	0.228
<b>Latino</b>	0.034	0.321	0.442	0.203
<b>Black</b>	0.035	0.214	0.417	0.334
<b>Asian</b>	0.034	0.319	0.546	0.101
<b>Other Race</b>	0.021	0.232	0.427	0.32

Table 2: Vaccine Timing Preferences by Age Group

Age Group	Already	ASAP	Hesitant	Resistant
<b>18-24</b>	0.034	0.284	0.477	0.205
<b>25-44</b>	0.041	0.268	0.401	0.289
<b>45-64</b>	0.025	0.329	0.403	0.242
<b>65+</b>	0.011	0.478	0.375	0.137

Table 3: Vaccine Timing Preferences by Gender

Gender	Already	ASAP	Hesitant	Resistant
<b>Female</b>	0.018	0.285	0.426	0.27
<b>Male</b>	0.04	0.384	0.384	0.191

Table 4: Vaccine Timing Preferences by Party ID

Party ID	Already	ASAP	Hesitant	Resistant
<b>Democrat</b>	0.037	0.426	0.411	0.127
<b>Independent/No Party</b>	0.016	0.228	0.403	0.352
<b>Republican</b>	0.026	0.272	0.401	0.301

**Finding 1:** There are far more people who are vaccine hesitant (are willing to take the vaccine eventually, but would rather not be at the front of the line) than vaccine resistant (do not ever want to get the vaccine), though there are groups – especially Black and non-Democratic respondents – for whom vaccine resistance is higher. For context, we note that longstanding and persistent inequalities in access to healthcare and institutions likely account for negative attitudes regarding vaccines, as well as associated skepticism regarding the safety of the COVID-19 vaccine, among Black respondents.

## Experiment Results

### *Message Experiment*

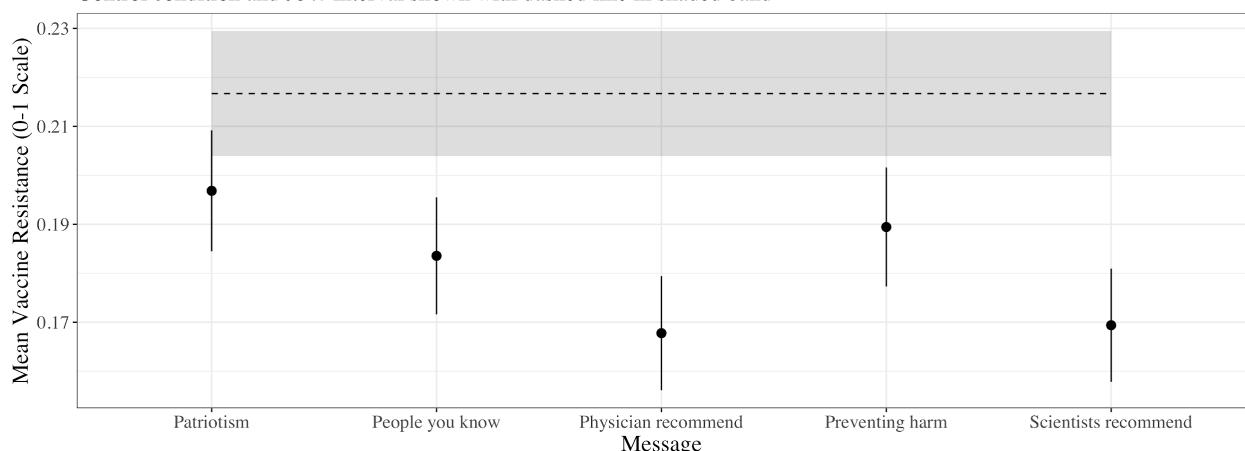
We first report results from the message experiment, where we find consistent reductions in vaccine resistance and increases in reported likelihood of getting vaccinated in all experimental conditions.

The average levels of vaccine resistance and likelihood across all conditions are shown in Figures 2 and 3. The point estimate and 95% uncertainty interval for the average values in the control condition are shown with a dashed line in a shaded band, while point estimates with 95% uncertainty intervals for the average values in each treatment condition are shown with point ranges. In general, endorsements from subject matter experts – scientists and respondents' personal physicians – are more persuasive than the other rationales for getting vaccinated, though only the differences between these conditions and the patriotism rationale condition are statistically significant.

Every treatment appears to matter, both for increasing vaccine likelihood (Figure 3) and reducing vaccine resistance (Figure 2) – except for the patriotism treatment, which did not significantly increase respondents' likelihood of taking the vaccine.

### Message Experiment, Resistance

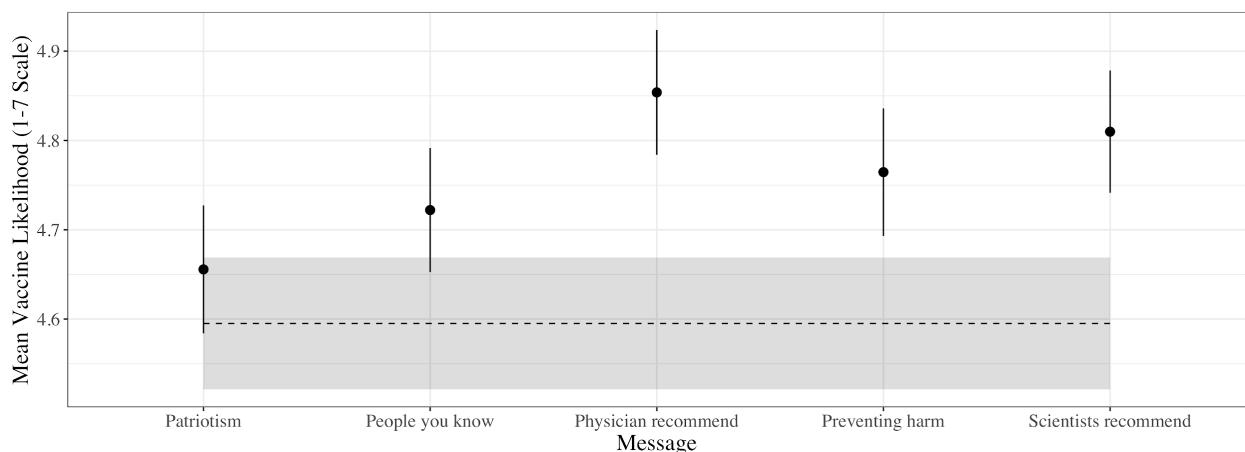
Control condition and 95% interval shown with dashed line in shaded band



**Figure 2: Vaccine Resistance in the Message Experiment.** Point ranges indicate the proportion of respondents who are resistant to getting vaccinated, with 95% uncertainty intervals in each treatment condition. Average vaccine resistance with 95% uncertainty interval is shown with the dashed line in the shaded band.

### Message Experiment, Likelihood

Control condition and 95% interval shown with dashed line in shaded band



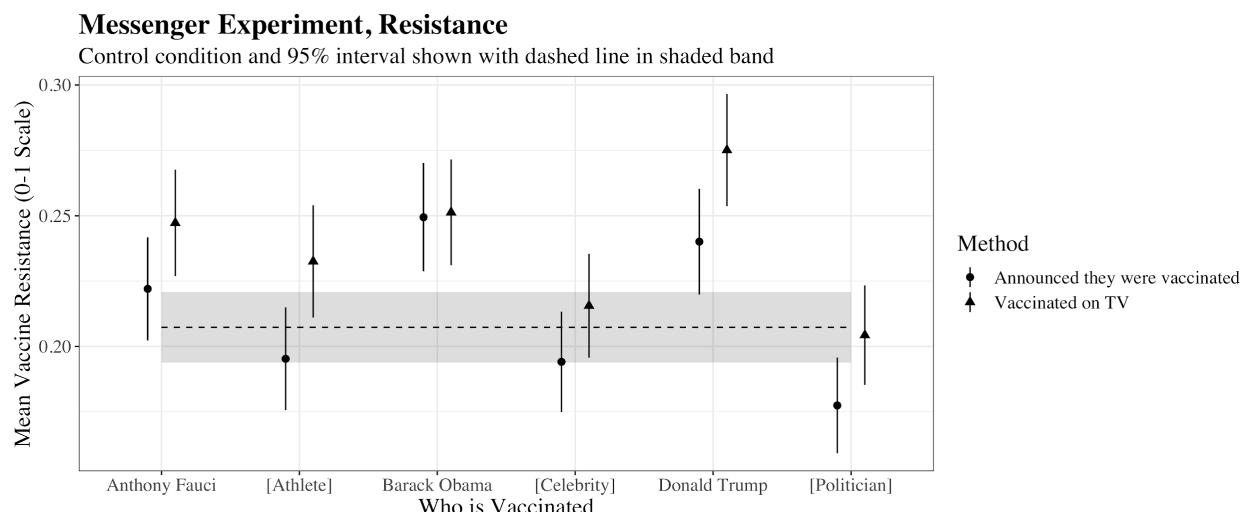
**Figure 3: Vaccine Likelihood in the Message Experiment.** Point ranges indicate the average likelihood of getting vaccinated, with 95% uncertainty intervals in each treatment condition. Average vaccine likelihood with 95% uncertainty interval is shown with the dashed line in the shaded band.

**Finding 2:** All of the tested messages resulted in reduction in vaccine resistance and all but one increased reported likelihood of vaccination. The “your physician recommends” and “scientists recommend” had the largest effects, and the patriotism appeal had the smallest.

## Messenger Experiment

We focus on vaccine resistance in the messenger experiment, showing the average effects of being exposed to different messengers in Figure 4.<sup>1</sup>

As the figure shows, messengers often have very slight effects on vaccine resistance. Only respondents' favorite politicians somewhat reduced reported resistance to getting vaccinated relative to the control condition, and politically charged messengers such as Barack Obama and Donald Trump actually caused resistance to increase.

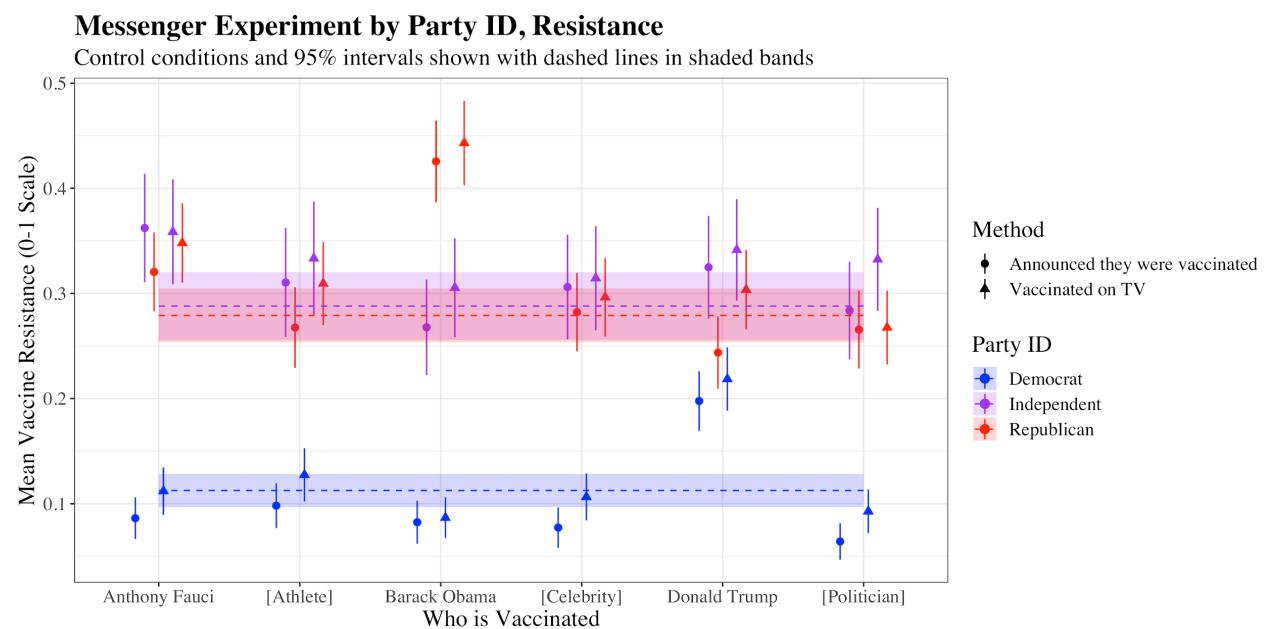


**Figure 4: Vaccine Resistance in the Messenger Experiment.** Point ranges indicate the proportion and 95% uncertainty interval for vaccine resistance in each treatment condition, with messengers represented on the x-axis and announcement method indicated by point shape. Rate of vaccine resistance with 95% uncertainty interval is shown with the dashed line in the shaded band.

The increases in resistance in the Obama, Trump, and (to a lesser extent) Fauci conditions are likely the result of out-partisan backfiring – with out-partisans becoming *more*, rather than *less* resistant after exposure to a messenger from the other party – as shown in Figure 5. Figure 5 presents the same information as Figure 4, but divides respondents by their partisan identification.

<sup>1</sup> We exclude respondents in the athlete, celebrity, and politician conditions who either did not write anything, or wrote that they did not have a favorite. This removes 11% of respondents from the athlete condition, 5% from the celebrity condition, and 13% from the politician condition.

As the figure shows, the most prominent increases in vaccine resistance emerge among Democrats when Trump is vaccinated and among Republicans when Obama is vaccinated. There is a smaller but similar pattern for Anthony Fauci, whose vaccination might result in small improvements in resistance among Democrats, but likely strengthens resistance among Republicans. This contrasts with the unspecified scientists and respondents' personal physicians invoked in the message experiment, who reduce vaccine resistance across the board and therefore suggests that Fauci has taken on some amount of partisan association.



**Figure 5: Vaccine Resistance in the Messenger Experiment by Party Identification.** Point ranges indicate the proportion and 95% uncertainty interval for vaccine resistance in each treatment condition, with messengers represented on the x-axis and announcement method indicated by point shape. Colors represent respondents' partisan identification: blue for Democrats, purple for independents, and red for Republicans. The 95% intervals for vaccine resistance in the control condition by partisan identification is represented in the shaded bands.

**Finding 3:** We see increased resistance, largely along partisan lines, when using certain prominent politicians as messengers. This suggests that the public vaccination of prominent politicians may backfire leading to increasing vaccine resistance on net because the negative effects from opposite partisans may outweigh the positive effects from co-partisans.

**Finding 4:** The vaccination of famous celebrities and sports figures may have minimal effects on vaccine resistance.

## **Takeaways**

Generally speaking, these experiments show that giving people reasons for taking the vaccine – especially when they involve recommendations from their doctor or scientists – is more effective than telling people about public figures who have taken the vaccine for reducing vaccine resistance and increasing reported likelihood of getting vaccinated. Moreover, the results also show that high-profile endorsements from political figures have the potential to increase vaccine skepticism among citizens who dislike the political figures in question. This suggests that, if vaccinations of public figures should be strategically utilized, it is preferable to emphasize those who are not overtly political or carefully target such messages to segments of the public that are likely to respond positively (e.g., fellow partisans).

## **Caveats**

We also note important caveats with these experiments. The most important caveat is that survey experiments can be difficult to generalize to the real world. The treatment captures the essence of a communication tactic (messenger/message), but the actual psychological impact of, for example, saying that your physician recommends that you be vaccinated versus your physician actually telling you to be vaccinated is likely quite different. Similarly, it is plausible that the reactions to Trump and Obama in the messenger experiments is really performative or “expressive” – that is, people use the response as an opportunity to register approval or disapproval of a political figure rather than to convey their actual likelihood of being vaccinated. Survey experiments serve as a “mouse model” of sorts for communication experiments, allowing relatively cheap screening of alternative interventions, but still requiring subsequent testing under more realistic and consequential conditions.

# **Appendix**

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## **Further Reading**

Bayes, Robin, James N. Druckman, Avery Goods, and Daniel C. Molden. 2020. "When and How Different Motives Can Drive Motivated Political Reasoning." *Political Psychology* 41(5): 1031-1052. URL: <https://onlinelibrary.wiley.com/doi/abs/10.1111/pops.12663>

Callaghan, Timothy, Ali Moghtaderi, Jennifer A. Lueck, Peter J. Hotez, Ulrich Strych, Avi Dor, Erika Franklin Fowler, and Matt Motta. 2021. "Correlates and Disparities of COVID-19 Vaccine Hesitancy." *Social Science & Medicine (In Press)*. URL: <https://www.sciencedirect.com/science/article/pii/S0277953620308571>

Chou, Wen-Ying Silvia, and Alexandra Budenz. 2020. "Considering Emotion in COVID-19 Vaccine Communication: Addressing Vaccine Hesitancy and Fostering Vaccine Confidence". *Health Communication* 35(14): 1718-1722. URL: <https://www.tandfonline.com/doi/full/10.1080/10410236.2020.1838096>

Goldstein, Susan, Noni MacDonald, Sherine Guirguis, and the SAGE Working Group on Vaccine Hesitancy. 2015. "Health communication and vaccine hesitancy." *Vaccine* 33(14): 4121-4214. URL: <https://www.sciencedirect.com/science/article/pii/S0264410X1500506X>

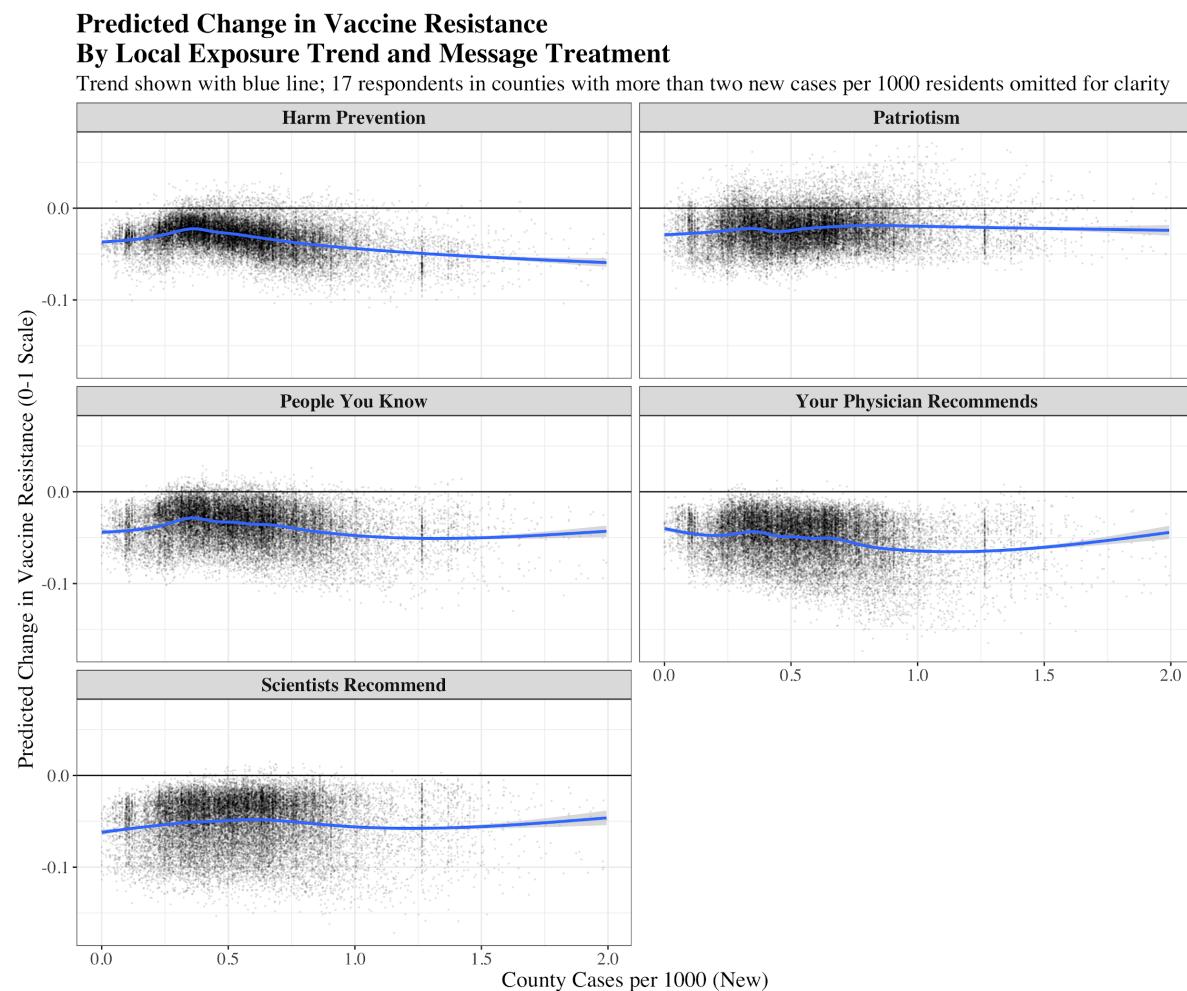
## **Additional Descriptive Tables and Figures**

Table A1: Vaccine Timing Preferences by Age Group and Gender

Gender	Age Group	Already	ASAP	Hesitant	Resistant
Male	18-24	0.045	0.284	0.504	0.167
Male	25-44	0.057	0.314	0.387	0.242
Male	45-64	0.036	0.394	0.369	0.202
Male	65+	0.013	0.566	0.323	0.097
Female	18-24	0.023	0.283	0.451	0.243
Female	25-44	0.025	0.225	0.415	0.335
Female	45-64	0.016	0.272	0.434	0.278
Female	65+	0.008	0.405	0.417	0.169

## Testing for Heterogeneous Effects

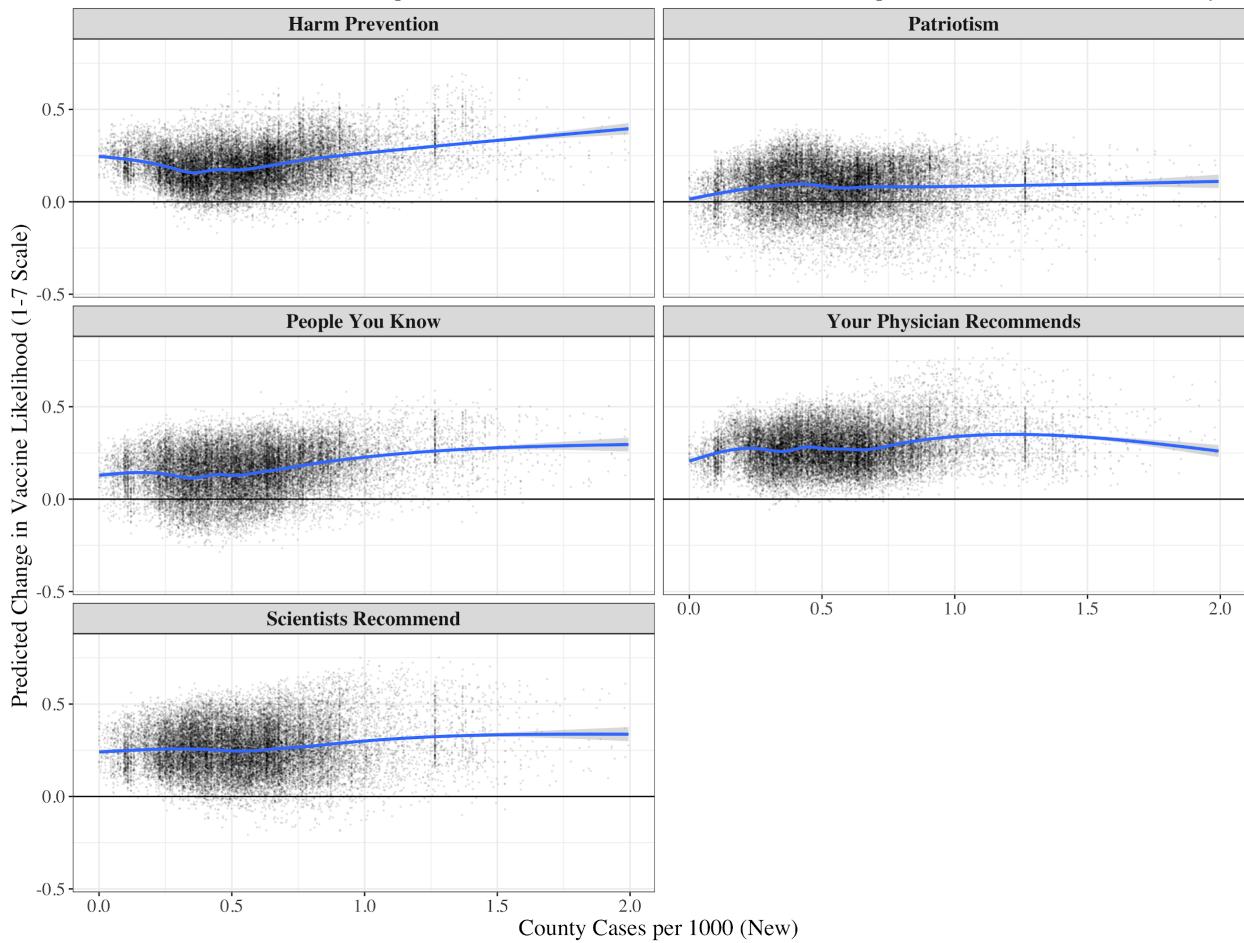
We elaborate on the findings from the message experiment by systematically investigating possible treatment effect heterogeneity – that is, differences in the strength of a given treatment for different respondents – [using the causal random forest](#). The causal random forest is a machine learning algorithm that identifies conditional average treatment effects that are robust to out-of-sample prediction when such conditional average treatment effects are present. Importantly, the method extends traditional experimental methods by allowing for the estimation of predicted treatment effects for each individual respondent in the data. This allows us to see if there are possibly unexpected sub-groups of respondents for whom a given treatment is particularly effective.



**Figure A1: Message Effects on Resistance by Local Case Trend.** Each point corresponds to an individual respondent; the x-axes reflect how quickly COVID-19 spread in the respondent's county during the week prior to them taking the survey, and the y-axes reflect the predicted change in the probability of saying they were "extremely unlikely" when provided with the given message relative to the control. Blue lines indicate the trend in the relationship: flatter indicates more consistent effects, while steeper indicates that predicted effects vary more by local case trend.

## Predicted Change in Vaccine Likelihood By Local Exposure Trend and Message Treatment

Trend shown with blue line; 17 respondents in counties with more than two new cases per 1000 residents omitted for clarity



**Figure A2: Message Effects on Likelihood by Local Case Trend.** Each point corresponds to an individual respondent; the x-axes reflect how quickly COVID-19 spread in the respondent's county during the week prior to them taking the survey and the y-axes reflect the predicted change in the respondent's reported likelihood of getting vaccinated when provided with the given message relative to the control. Blue lines indicate the trend in the relationship: flatter indicates more consistent effects, while steeper indicates that predicted effects vary more by local case trend.

Generally speaking, there is little heterogeneity – individual respondents are predicted to react to these treatments in similar ways. However, of the variables considered, one possible source of heterogeneity in the effects of some treatments is local prevalence of COVID-19 – specifically, the rate at which COVID-19 was spreading in respondents' counties immediately prior to them taking our survey. This is shown in Figures A1 and A2, which plot predicted individual-level treatment effects by the number of new COVID-19 cases per 1000 residents in respondents' counties during the week prior to taking the survey.

The bulk of predicted effects are clustered together around the overall average effect for each treatment, and the trend lines are relatively flat in most conditions. As noted above, the treatment effects we observed in this experiment are largely consistent across all respondents. However, particularly in the Harm Prevention condition and to a lesser extent the People You Know condition, effects are somewhat larger among respondents who live in counties where COVID-19 was spreading at a faster rate prior to their survey date, as indicated by the downward-sloping trend lines in Figure A1 (resistance) and upward-sloping trend lines in Figure A2 (likelihood).