Research Article

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Message framing, partisanship, and popular support for COVID-19 vaccine mandate for all adults: Evidence from a preregistered survey experiment

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Abstract: Following the outbreak of COVID-19, the federal government in the United States required some population groups to be vaccinated. Other countries imposed even more comprehensive vaccination requirements. We conducted a preregistered randomized survey experiment that evaluated whether emphasizing the societal or economic benefits could shift popular support for a COVID-19 vaccine mandate for all adults. The experiment was embedded in a survey conducted in May 2022 on a sample of 1,199 registered voters in South Dakota. Participants were randomly assigned into a control group (n = 394), communitarian frame group (n = 403), or economic frame group (n = 379). Results of difference-of-means tests and multivariate regression analyses showed that neither of the experimental treatments had a statistically significant impact on support for mandatory COVID-19 vaccination. We found that these attitudes were primarily driven by partisan self-identification. Our results underscored the political nature of attitudes toward the COVID-19 pandemic and particularly mandatory COVID-19 vaccination.

Keywords: COVID-19, vaccine mandate, partisan self-identification, survey experiment

1 Introduction

In January 2020, the federal government in the United States declared the outbreak of COVID-19 a public health emergency. Achieving a high vaccination rate in society was key to the efforts to contain the spread of the virus. In December 2020, COVID-19 vaccines were made available to the public at no cost at health clinics, pharmacies, community vaccination centers, and other facilities. By midsummer of 2021, despite the availability of vaccines and encouragement from the federal government and public health leaders, vaccine uptake lagged behind their expectations. The accelerated pace of vaccine development combined with the rapid spread of misinformation and disinformation on social media, sometimes endorsed by medical authorities and political elites, undermined people's trust in vaccines [1–3]. The goal set by President Biden that 70% of adults receive at least one dose of the vaccine before the 2021 Independence Day holiday was not reached. To increase COVID-19 vaccination rates, in September of 2021, the federal government announced vaccination mandates for federal employees, healthcare workers, and military personnel. Unlike South Dakota, some states (such as California and New Jersey) and localities (such as Tucson, Arizona, and Portland, Oregon) across the United States also imposed mandates for specific professions, such as public employees and educational workers. At that time, other countries introduced more sweeping COVID-19 vaccination policies, and some even required all adults to receive a vaccination.

Despite the potential to increase the number of vaccinated people, COVID-19 mandates were a contested topic among experts and the public. Scientists debated the philosophical and ethical dimensions of such mandates [4–6]. While some experts concluded that "COVID-19 vaccine mandates are legally and ethically permissible" [7], others remained cautious if not outright skeptical [8,9].

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Public opinion studies from multiple countries showed mixed support for a general population mandate [10–13]. A 2020 study from Germany suggested that a COVID-19 vaccine mandate might hinder efforts to vaccinate [14], and a 2021 study from the United Kingdom led some healthcare workers to resign from their positions [15]. A related study conducted in April 2021 in the United Kingdom found that introducing a COVID-19 vaccine passport would decrease the inclination to accept a COVID-19 vaccine [16]. Such research bolstered experimental findings that a vaccine mandate might have lowered the willingness to receive vaccination [17].

A COVID-19 vaccine mandate proved to be a contentious topic politically. While management of the COVID-19 outbreak was primarily a medical and public health issue, scholars lamented the high degree of politicization [2,18]. In the United States, partisan self-identification steered attitudes toward various COVID-19 mitigation practices. Scholars have consistently reported that Republicans are significantly less likely to be vaccinated than Democrats [1,19,20]. The partisan nature of COVID-19 attitudes is similar to the polarization over other scientific issues, such as climate change and various childhood vaccinations [21–23].

Partisan self-identification also shapes attitudes toward various types of COVID-19 vaccine mandates. One study reported that political conservatism, which closely correlates to Republican Party identification, was linked to lower support for vaccine mandates for the general population [24]. Compared to Democrats, Republicans are more likely to oppose vaccine mandates for both students and teachers [25]. On the other hand, liberals are more supportive of vaccine mandates for healthcare workers and air and train travelers [26].

Despite the politicization of the pandemic response, other factors shaped attitudes toward COVID-19 mitigation practices [27–29]. Though the public health emergency for COVID-19 has expired, public health officials and policymakers might still take lessons on how to navigate the partisan nature of attitudes toward the COVID-19 pandemic as they prepare for future emergencies. Building upon the extant research on COVID-19 attitudes, we test two frames that could nudge respondents toward accepting a COVID-19 vaccine mandate: a communitarian frame and an economic frame. We test these frames in a random sample of registered voters in the US state of South Dakota, a state that is relatively rural, white, and conservative. These traits are associated with greater COVID-19 vaccine hesitancy and skepticism of COVID mitigation efforts, thus making the South Dakota population a good "least likely" test subject. Understanding what works, and what doesn't work, in crafting public health messages in "Red States" is critical information for public health officials. The findings of this study can help policymakers prepare for future public health crises.

2 Framing of public health messages and popular support for the COVID-19 vaccine mandate

Experts have emphasized the importance of effective health communication in bringing the COVID-19 pandemic under control [30,31]. Evidence exists that interventions can nudge people toward receiving a COVID-19 vaccination [32–35]. Interventions can also increase adherence to mitigation practices before vaccination [27,36] and after vaccination [37]. Overall, extant literature has shown that despite the importance of partisan self-identification in shaping attitudes toward all things COVID-19-related, several factors might attenuate its effects. Carefully framed public health messages could make inroads into people having a broader acceptance of a COVID-19 vaccination mandate. We evaluate how two frames – a communitarian frame and an economic frame – affect people's attitudes toward a COVID-19 vaccine mandate.

2.1 Communitarian frame

We suggest that a public health message emphasizing the community benefits of a vaccine mandate benefits might increase popular support for a COVID-19 vaccine mandate. This frame emphasizes prosocial tendencies and considers the welfare of others. The mandate can help reduce the risk of the transmission of the virus, the number of people infected, and the number of deaths due to COVID-19. At the time of the survey, the total number of COVID-19 cases in the United States exceeded 79 million, and the number of deaths had surpassed 981,000. In South Dakota, the number of cases reached 237,000 and the number of deaths exceeded 2,800. A vaccine mandate will protect the most vulnerable parts of society, such as the elderly and those who cannot be vaccinated due to compromised immunity.

Evidence exists that prosocial motives increase human papillomavirus vaccine uptake [38] as well as influenza vaccine uptake [34]. A study using a hypothetical infectious disease found the same relationship [39]. Evidence exists that altruism also predicts COVID-19 vaccination intentions [40].

Experimental studies demonstrated that frames emphasizing benefits to other people in the community increase people's willingness to wear a mask [28,41,42] and receive a COVID-19 vaccination [33,36,43]. We hypothesize that a similar relationship might exist between messages emphasizing the communitarian benefits of a COVID-19 mandate and public attitudes toward such a mandate. Therefore, we propose that:

> H1: Participants who read a message emphasizing the communitarian benefits of a COVID-19 vaccine mandate are more likely to support such a mandate, compared to participants who read the control group message.

2.2 Economic frame

We also propose that public health messages emphasizing the economic benefits of a COVID-19 vaccine mandate to society might be successful. Besides human costs associated with COVID-19, we also need to consider the economic costs of the pandemic. The unemployment rate in the United States reached almost 15% in April 2020, and the economy contracted by more than 3% that year. The pandemic hit the economically vulnerable groups particularly hard. This experimental frame emphasizes the economic costs of the pandemic and how a vaccine mandate can prevent people from experiencing the same hardship as when the pandemic first erupted.

While experts estimated that increasing vaccination rates would benefit the economy [44], it is unclear if the general population holds the same opinion. An experimental study found evidence that a frame that emphasized the negative economic consequences of the COVID-19 pandemic increased the willingness to take a vaccine [45]. A similar study [36] did not find evidence for the impact of an economic benefits frame on willingness to receive a COVID-19 vaccine. A treatment emphasizing how a COVID-19 vaccination would help economic recovery found a positive but not statistically significant impact on vaccination intentions [46]. A small-N study conducted in Columbia found that health-related messages were more effective than economy-related messages at encouraging washing hands and lockdown compliance [47]. Still, given the sizeable economic costs of the pandemic on Americans, a public health message that emphasizes the economic benefits is likely to increase popular support for a COVID-19 vaccine mandate. Thus, we hypothesize that:

> H2: Participants who read a message emphasizing the economic benefits of a COVID-19 vaccine mandate are more likely to support such a mandate, compared to participants who read the control group message.

3 Research design

3.1 Sample

We conducted a preregistered and randomized survey experiment to evaluate our hypotheses.[1] The experiment was embedded in a larger survey that examined attitudes toward political and public health issues. The survey was conducted by the authors and was supported by [University name redacted for peer review]. Using registration-based sampling, we mailed invitation letters to 21,700 randomly selected voters in South Dakota. Registration-based sampling enables researchers to build representative samples with several known population parameters since the sample is drawn from public records [48]. The invitation letter contained a link and a QR code to direct respondents to a survey hosted on the *QuestionPro* survey platform. The survey was conducted from May 2 to May 15, 2022. We received 1,199 responses, yielding a response rate of 5.5%, which is comparable to similar state-wide surveys [29,48]. Participants did not receive any compensation for completing the survey. The study was approved by the Institutional Review Board of [University name and approval number redacted for peer review].

We report the demographics of study participants in the Supplementary (Table S1). Overall, our sample is broadly representative of the state population, although we slightly oversampled older adults. Thus, our participants are more likely to be vaccinated because older adults have higher COVID-19 vaccination rates. We suspect that the age imbalance is a consequence of our recruitment method, as older adults are more likely to be registered to vote and have the time to participate in a study without financial compensation. To correct these imbalances, we used entropy balancing to weight the survey data on age and COVID-19 vaccination status, as well as gender and political party registration [49]. Table S2 describes the weights employed.

3.2 Experimental design

Participants were randomly allocated to one of three groups – one control group and two treatment groups. Respondents in the control group read a short message about the debate surrounding COVID-19 vaccine mandates. Participants in the communitarian treatment group read the same message, which also included a reference to the communitarian

1 https://osf.io/45a9b/?view_only=17c9b05b58c541ae94a0303a80c798f1.

benefits of a COVID-19 vaccine mandate. Respondents in the economic treatment group read the same message as participants in the control group, with the addition of a reference to the economic benefits of a COVID-19 vaccine mandate (Supplementary S2). All participants immediately answered the same question regarding their support for a COVID-19 vaccine mandate after reading the prompts (Supplementary S3). The results of the balance tests reveal that the randomization protocol was successful (Table S3).

3.3 Measures

The dependent variable of our study is support for a COVID-19 vaccine mandate, which we measured with a question that has been previously used: "Overall, how supportive are you of the idea of mandatory COVID-19 vaccination for all adults, except for medical or religious exemptions?" The distribution of preferences was sharply polarized across the control and both experimental groups (Table S4). We also included questions on age (in years), gender (an indicator for males), evangelical identity (an indicator), COVID-19 vaccination status (an indicator for any level of COVID-19 vaccination), and partisan self-identification, which previous studies linked to attitudes toward COVID-19 vaccine mandates [10,26,50]). The survey also included an attention check question, which over 98% answered correctly (full text of all questions is available in Supplementary S2. We include a correlation matrix table in the Supplementary (Table S5), which shows low levels of correlation between our independent variables.

3.4 Analysis

We evaluated the preregistered hypotheses in several ways. First, we conducted difference of means tests (using *t*-test) between the control group and each of the treatment groups, including an analysis of several sub-groups. Second, we estimated an ordered logistic regression model using support for the COVID-19 vaccine mandate as the dependent variable, along with indicators for the two experimental treatments, age, gender, education, partisan self-identification, COVID-19 vaccination status as independent variables.[2] All analysis was conducted in Stata 17.

4 Results

Results of a difference of means tests showed that participants in the control group recorded a score of 2.441 on a 5-point scale on support for a COVID-19 vaccine mandate. Participants in economic and communitarian frames displayed mean scores of 2.639 and 2.334, respectively (Table S6). The differences between the two treatment groups and the control group were not statistically significant. Therefore, we did not find support for either of the two hypotheses. Table S7 showed that none of the subsets of the population – based on age, political party affiliation, gender, and evangelical identity – are responsive to the framing effects. In sum, all difference of means tests we conducted yielded statistically non-significant results.

The results of the ordered logistic regression, visualized in Figure 1, were consistent with the conclusions of the difference of means tests. We included full results in the first column of Table S8. Neither of the two indicators for experimental treatments reached the threshold for statistical significance. Partisan self-identification, evangelical identity, and COVID-19 vaccination status are statistically significant. In other words, Republicans, evangelical Christians, and the unvaccinated were opposed to a COVID-19 vaccine mandate. Education, age, and gender were statistically non-significant. We conducted additional tests to check for the robustness of the results, which we reported in Table S8. An ordinary least squares regression using the same variables yielded similar results in terms of direction, statistical significance, and substantive effect. We also estimated an ordered logistic regression model with unweighted data, and again, the results on the two experimental variables were null.

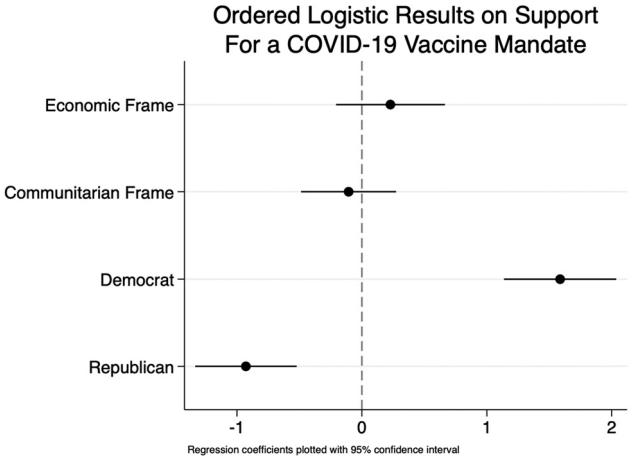

Figure 1: Ordered logistic regression on support for a COVID-19 vaccine mandate.

2 Due to case-wise deletion of missing values on some variables, the sample size in multivariate models was slightly lower.

5 Discussion

During the COVID-19 public health emergency, the government in the United States considered vaccine mandates to increase COVID-19 vaccination rates in society. The results of our study showed that neither of the two frames that we explored – emphasizing the communication or economic benefits of mandatory vaccination – shifted people's attitudes toward it. Though the threat from COVID-19 has diminished and the public health emergency expired, public health officials and policymakers should keep in mind the partisan nature of attitudes toward vaccine mandates as they prepare for future emergencies.

Our study added to the scholarship that explored the impact of framing effects on people's attitudes toward COVID-19 mitigation policies that were implemented during the public health emergency. The results were in line with similar studies that reported null results. For example, [36,46] did not find support for a statistically significant effect of the economic frame on vaccination intentions. A recently published meta-analysis reported, "mixed effectiveness of framing on vaccination intention" [51]. Our findings confirm that partisan self-identification affects people's opinions on COVID-19 vaccine mandates. Existing studies uncovered strong resistance among Republicans and political conservatives [1,25,26]. Multivariate analysis results show that partisan self-identification had the greatest effect on support for a vaccine mandate.

This study was not without limitations. The survey is from South Dakota and is therefore not fully representative of the broader American population. South Dakota is a predominantly white, rural, socially conservative, and solidly Republican state with lower Covid-19 vaccination rates than the national average. While this setting provides a good "least likely case" for our study since these are the people who are most resistant to vaccine mandates, the generalizability of our results to more heterogeneous areas might be limited.

As a consequence of our data collection method, we reached only registered voters in the state. We might have missed those residents who are either not eligible to vote or are not registered to vote. Lack of Internet access might have prevented some invitees from participating in our study. As we did not provide a financial reward for completing the survey, our sample contains an above-average number of older adults. Because this population subgroup is more likely to be fully vaccinated and boosted, we also oversampled the number of vaccinated residents.

In the future, scholars may wish to explore the effect of other frames on attitudes toward vaccine mandates. Perhaps because the benefits of a vaccine mandate to the broader society are less apparent to people than private benefits, we did not see an effect for either of the two treatments. It would be worthwhile to investigate whether emphasizing the private benefits of a vaccine mandate would be a more effective strategy. Scholars might also explore whether encouragement from trusted leaders could boost popular support for this policy. While we only varied the content and not the source of the massage, evidence exists that the messenger affects the success of messages encouraging vaccination [3,35].

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Informed consent: Informed consent has been obtained from all individuals included in this study.

Data availability statement: The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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