

Question 3 - Are people who believe that science is important for making government decisions about COVID-19 more likely to disapprove of the way their governor is handling the pandemic?

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Importance and Context

Are people who believe that science is important for making government decisions about COVID-19 more likely to disapprove of the way their governor is handling the pandemic?

At the onset it appeared as though the nation was united in protecting ourselves against the new virus, setting aside divisions in an attempt to preserve life. However, as the pandemic raged on, it is clear that individual citizens and local governments did not always see eye to eye when it came to handling the spread of COVID-19. In this report, we plan to explore the role that believing in science played in the public's opinion of the local governor's actions during the pandemic. The answer could provide guidance on the communication tactics and actions of local governments, illuminating beliefs and biases that may help or hinder future crisis response.

The data used in the following test and analyses comes from the 2020 ANES survey. The survey used various tactics to collect information, including surveys, videos, and phone interviews. The 2020 sample group was made up of previous ANES survey respondents as well as new participants, directed at United State's residents over the age of 18.

Description of Data

The complete 2020 ANES study consists of 8280 respondents and 1381 variables. Using information provided from the User Guide and CodeBook document, we focused on the following variables as they relate to our question at hand:

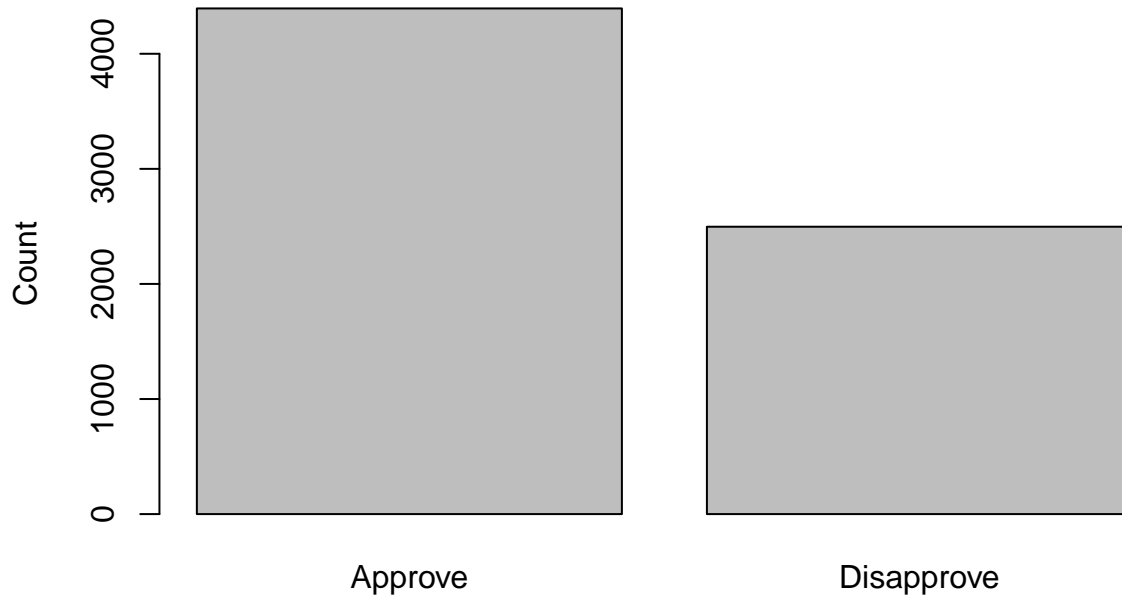
- **V201145 - PRE: Approve or disapprove R's governor handling COVID-19**
- **V201146 - PRE: How much approve/disapprove R's governor handling COVID-19**
- **V201147x - PRE: SUMMARY: Approve or disapprove R's governor handling COVID-19**
- **V202310 - How important should science be for decisions about COVID-19**

In order to address the question, we must first identify which respondents 'believe in science' to determine if they are more likely to approve or disapprove of their governor's actions in regards to COVID-19. We selected variable **V202310** to determine whether or not the participant thought science was important for decisions about COVID-19. The belief in the importance of science was ranked with a Likert scale-like choice from **1 (not at all important)** to **5 (extremely important)**. Any non-responses or refusal to answer was removed from the population, bringing us from 8280 responses to 7383 responses. We filtered further by including only participants who selected **3 (Moderately Important)**, **4 (Very Important)**, or **5 (Extremely Important)** in our subset of those who believe in science. Those who chose **1 (Not at all important)** or **2 (A little important)** did not demonstrate a strong enough inclination towards science to be included. Filtering this data set dropped our sample size from 7383 to a population of 6924 who believe science is important for decisions about COVID-19.

Figure 1 shows a comparison of those who 'Approve' or 'Disapprove' of their governor's actions within our filtered population of those who at least believe science is moderately important:

1. Not at all important
2. A little important
3. Moderately important
4. Very important
5. Extremely important

Sample Respondents' Approval or Disapproval of Gov. Actions



Approval or Disapproval of Governor's response to COVID-19

We then focused on variables about the approval or disapproval of the respondent's governor in handling COVID-19. While **V201146** and **V201147x** do capture information related to approval and disapproval, both are Likert scale-like variables, and we determined the binary variable **V201145** to be much more effective for testing purposes due to being metric. Within our 6924 sample of those who believe science is at least moderately important, we excluded non-responses and 'refusal to respond' answers to the **V201145** variable. After filtering, our sample went from 6924 to 6891 total respondents.

Most appropriate test

Given the binary response of our **V201145** variable, a simple binomial test can be used to determine whether our sample is more likely to disapprove of their governor's handling of COVID-19. The assumptions for a binomial test include a fixed number of observations, which we have previously concluded as being our filtered population. Next, the observations are independent of one another, and are a subset of the overall population. Each is dichotomous - a success or failure, in our case, the success is a respondent who disapproves of the governor's actions and a failure is the approval. Lastly, the probability assumption is met as either outcome has a 50% chance of occurring.

To answer this question, we begin with the two hypothesis:

- $H_o : \mu = 0.5$; Those who believe in science are equally likely to approve or disapprove of their governor's actions in response to COVID-19. In other words, that the probability of either approving or disapproving is exactly 50%.
- $H_a : \mu \neq 0.5$; There is a difference in the probability of those who believe in science approving or disapproving of their governor's action in relation to COVID-19. The probability of a success (**disapprove**, in this case) is not equal to 50%.

##

```
## Exact binomial test
##
## data: 2497 and 6891
## number of successes = 2497, number of trials = 6891, p-value < 2.2e-16
## alternative hypothesis: true probability of success is not equal to 0.5
## 95 percent confidence interval:
## 0.3509952 0.3738348
## sample estimates:
## probability of success
## 0.3623567
```

We also chose to perform a one-sample t-test to test our filtered data because as a parametric test, this method has strong statistical power and can be used in comparison to our binomial output. The data is metric, the observations are independent of one another as they are different individuals, and unnecessary outliers (observations less than 0) were removed. The large sample size also invokes the central limit theorem to normalize the data as is needed for this test. The null and alternative hypothesis remain the same as stated above.

```
##
## One Sample t-test
##
## data: filtered_345science$"Gov. Handling"
## t = 80.02, df = 6923, p-value < 2.2e-16
## alternative hypothesis: true mean is not equal to 0.5
## 95 percent confidence interval:
## 1.294181 1.334069
## sample estimates:
## mean of x
## 1.314125
```

Test, results and interpretation

In both the one-sample t-test and the binomial test the p-value is less than 0.05, and we therefore reject the null hypothesis. In other words, there is evidence to suggest that the probability of a respondent who believes in science disapproving of their governor is not equal to the probability of them approving of the governor - that their probabilities are something other than 50%. In the case of our binomial test, we see that there is a 36.2% probability of someone who believes in science disapproving of the governor's actions in response to COVID-19 within our sample population.

These findings are interesting, as one's initial thought may be that those who believe in science are more likely to disapprove of their governor's actions related to COVID-19. As our testing shows, that is not the case. Political actions can sometimes elicit emotional reactions, so perhaps it is those who disagree most strongly that are the loudest despite being the minority in our case. This is important for understanding what worked and did not work in the course of local government during the pandemic, and can influence future actions and elections.