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Policy Views and Negative Beliefs About Vaccines in the United States, 2019

Dominik A. Stecula, PhD, Ozan Kuru, PhD, Dolores Albarracin, PhD, and Kathleen Hall Jamieson, PhD

Objectives. To determine whether holding vaccine misconceptions, in the form of negative beliefs about vaccines, correlates with opposing governmental action at all levels designed to increase vaccination (e.g., removing personal belief and religious vaccine exemptions).

Methods. Drawing on data from a nationally representative survey of 1938 US adults, we assessed the relation between negative beliefs about vaccines and provaccination policies.

Results. Beyond sociodemographic and policy-relevant variables, such as gender and partisan affiliation, questionable negative beliefs about vaccines are the strongest predictor of opposition to policies designed to increase vaccination.

Conclusions. Negative beliefs about vaccines in the general population may thwart the passage or implementation of policies designed to increase vaccination. Implementing strategies that reduce these negative beliefs should be a priority of educators and public health officials. (*Am J Public Health.* 2020;110:1561–1563. doi:10.2105/AJPH.2020.305828)

In 2019, the United States experienced one of the worst measles outbreaks in a quarter century.[1] Four years before, in response to the Disneyland outbreak, the state of California increased vaccination coverage by removing nonmedical (personal belief and religious) vaccine exemptions.[2] Since then, several states have attempted to tighten their own vaccine laws, but in some cases, most recently New Jersey, a vocal antivaccine lobby successfully opposed the state's efforts.[3] At a time when the world is fighting the COVID-19 pandemic while awaiting a vaccine, understanding the implications of vaccine misconceptions is critically important to public health.

Vaccine misconceptions, in the form of questionable negative beliefs about vaccines, is a potential determinant of the mixed level of public support for provaccine policies. During the 2019 US measles outbreak, between 15% and 20% of US adults accepted at least 1 widely circulated antivaccination claim.[4] Although embrace of such claims is known to correlate with a reduced likelihood of vaccination,[5,6] scholars have not answered this question: do negative beliefs about vaccines also affect the level of public support for provaccination policy, and if so, to what extent?

METHODS

We conducted this study during the 2019 measles outbreak in the United States, drawing on a large, nationally representative panel study of US adults to examine associations between vaccine misconceptions and support for provaccine policies. We controlled for sociodemographic status, partisan affiliation, media consumption, trust in the Centers for Disease Control and Prevention (CDC), religiosity, and whether there was a young child in the home, considering that parents might be more opposed to eliminating vaccine exemptions than are people without young children.[4]

Specifically, our research relied on responses from 1938 randomly drawn respondents collected in a longitudinal panel study focused on perceptions of infectious diseases and vaccination predictors conducted in 2018 through 2019, when the United States was in the midst of a measles outbreak. The National Opinion Research Center at the University of Chicago gathered the data as part of their AmeriSpeak panel, a probability-based, nationally representative sample of US adults.[7] We primarily focused on wave 4 (administered February 28–March 25, 2019) for predictor variables and wave 6 (September 13–October 2, 2019) for policy support variables.

Three dependent variables focused on support or opposition for 3 provaccine policies: (1) support for mandatory childhood vaccinations, (2) opposition to religious vaccine exemptions, and (3) opposition to personal belief and philosophical exemptions. We measured each with a 5-point scale (1 = strongly oppose; 5 = strongly support) with items 2 and 3 reversed so that the higher scores in each of the 3 items indicated support for the provaccine policy.

Our key independent variable was vaccine misconceptions in the form of negative beliefs about vaccines, measured using 4 items.

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These items gauged support for common antivaccination claims,[8] including that (1) vaccines cause autism, (2) vaccines are full of toxins, (3) delaying vaccinations and altering the vaccine schedule is not harmful, and (4) developing natural immunity by catching the disease is superior to getting vaccinated. Responses were measured on a 4-point scale: "very inaccurate" (0) to "very accurate" (3). We averaged the responses to each item into a continuous index (ranging from 0 to 3) and then divided by 3 to rescale it into 0 to 1 for ease of interpretation. The Cronbach α for the index was 0.79.

Our analysis controlled for theoretically relevant variables that could reasonably shape policy views about vaccines, which included the sociodemographic variables of gender, education, income, and age. We also controlled for self-described religiosity, partisanship (standard strength of party affiliation, ranging from strong republican [1] to strong democrat [5]) the presence of a young child (younger than 6 years) in the household (1 = yes; 0 = no), and trust in the CDC (0 = very little trust at all; 3 = a great deal of trust). Since the study took place during a major measles outbreak, we also controlled for recent exposure to measles and measles, mumps, and rubella (MMR) news in traditional media (e.g., newspapers, magazines, radio, television) and on social media (e.g., Facebook, Twitter, YouTube, Instagram). We combined the questions about MMR and measles, for which response options ranged from "never" (0) to "often" (3), into simple additive indices, for which the Cronbach alphas were 0.94 for traditional media and 0.95 for social media.

Given that our dependent variables were ordinal, we regressed policy support on the predictors using multivariate ordered probit models. Details about question wording and the data used to produce Table 1 appear in the appendices (available as a supplement to the online version of this article at http://www.ajph.org).

RESULTS

We found broad support for provaccination policies in the US population: 72% of US adults strongly or somewhat supported mandatory childhood vaccination, 60% strongly or somewhat opposed religious exemptions for vaccines, and 66% strongly or somewhat opposed personal belief exemptions in their states.

Among the factors that we observed, negative vaccine beliefs were the strongest negative predictor of support for provaccination policies. In the presence of controls, moving from the least (0) to the most (1) negative beliefs about vaccines reduced the probability of strongly supporting mandatory childhood vaccines by 70%, the probability of strongly opposing religious exemptions by 66%, and the probability of strongly opposing personal belief exemptions by 79%. The introduction of negative beliefs accounted for a substantial increase in the variance explained by the model, a conclusion documented by the pseudo R^2 changes between the models displayed in Table 1.

Furthermore, we found that exposure to news about measles and MMR played a role in policy considerations during an outbreak. Moreover, the source of the news mattered, in that traditional news was associated with more provaccine policy views, whereas exposure to news on social media was associated with less provaccine policy views. We found that trust in the CDC, religiosity, and, in some cases, presence of a young child in the

TABLE 1—Ordered Probit Weighted Regression Models of Determinants of Provaccine Policy Support: United States, 2019

	Support Mandatory Vaccines, b (SE)		Oppose Religious Exemptions, b (SE)		Oppose Personal Exemptions, b (SE)	
Variable	Model 1 (n = 1680)	Model 2 (n = 1678)	Model 3 (n = 1683)	Model 4 (n = 1681)	Model 5 (n = 1682)	Model 6 (n = 1680)
Female	0.22** (0.07)	0.24** (0.08)	0.15* (0.07)	0.16* (0.07)	0.20** (0.07)	0.22** (0.07)
Education	−0.00 (0.04)	−0.08 (0.05)	0.03 (0.04)	−0.04 (0.05)	0.04 (0.04)	−0.04 (0.05)
Income	0.02 (0.01)	0.01 (0.01)	0.02** (0.01)	0.02* (0.01)	0.02* (0.01)	0.01 (0.01)
Age	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Religiosity	−0.08* (0.03)	−0.04 (0.03)	−0.19*** (0.03)	−0.16*** (0.03)	−0.15*** (0.03)	−0.12*** (0.03)
Young child in the household	−0.27* (0.11)	−0.30* (0.11)	−0.17 (0.11)	−0.18 (0.10)	−0.14 (0.11)	−0.16 (0.12)
Political affiliation (Democrat)	0.03 (0.02)	0.03 (0.02)	0.03 (0.02)	0.03 (0.02)	0.04* (0.02)	0.05* (0.02)
Recent MMR traditional media exposure	0.21*** (0.05)	0.20*** (0.05)	0.19*** (0.05)	0.17*** (0.05)	0.21*** (0.05)	0.19*** (0.05)
Recent MMR social media exposure	−0.14** (0.05)	−0.13** (0.05)	−0.14** (0.05)	−0.13** (0.05)	−0.11** (0.05)	−0.09 (0.05)
Trust in the CDC	0.59*** (0.05)	0.30*** (0.06)	0.45*** (0.05)	0.16** (0.06)	0.58*** (0.06)	0.25*** (0.06)
Negative vaccine beliefs		−2.16*** (0.21)		−2.07*** (0.22)		−2.54*** (0.23)
Pseudo R^2	0.08	0.13	0.07	0.11	0.09	0.14
Average marginal effect of negative vaccine beliefs[a]		−0.70*** (0.06)		−0.66*** (0.07)		−0.79*** (0.06)

Note. CDC = Centers for Disease Control and Prevention; MMR = measles, mumps, and rubella.

[a]Marginal effects (dy/dx) are based on the specified regression model with all controls, predicting strong support of mandatory vaccines, strong opposition to religious exemptions, or strong opposition to personal belief exemptions. We provide these marginal effects because ordered probit coefficients are difficult to interpret. Results are weighted to match the US population at the time of data collection, 2019.

*P < .05; **P < .01; ***P < .001.

household and partisanship also correlated with policy views, but these correlations were smaller in magnitude.

DISCUSSION

Negative vaccine views are the primary driver of reservations about provaccination policy, showing us how misperceptions can have the potential to shape policy decisions in this context.

Consistently with previous work, we also show that factors such as the news media and trust in experts shape vaccine considerations.[4] Furthermore, at a time characterized by high levels of partisan polarization in the United States, many policy preferences are driven by one's partisan attachments.[9] However, our results show that, although partisanship plays a role, negative vaccine views matter more than political affiliation.

PUBLIC HEALTH IMPLICATIONS

These results are relevant to the COVID-19 pandemic. Once a safe and effective vaccine is developed, misinformation, in the form of negative views about vaccines, could increase opposition to policies designed to increase vaccination rates. As a result, the nation and individual states could have difficulty achieving the levels of community immunity needed to minimize transmission of SARS-CoV-2. Because reservations about possible requirements to vaccinate against SARS-CoV-2 are already evident,[10] educators and public health professionals should intensify their efforts to reduce misconceptions about vaccines. AJPH

CONTRIBUTORS

D. A. Stecula analyzed the data. D. A. Stecula and O. Kuru wrote the brief. All authors edited and revised the brief and were part of the team that designed the study.

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CONFLICTS OF INTEREST

All authors declare no conflicts of interest.

HUMAN PARTICIPANT PROTECTION

The University of Pennsylvania institutional review board approved and deemed exempt the research protocol employed in this study.

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