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# Can we convince the unvaccinated to vaccinate: lessons from COVID-19 vaccination

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## Abstract

**Background** Vaccine hesitancy affects vaccine uptake. Despite initial reluctance to receive the COVID-19 vaccine in 2020, by 2021, many individuals chose to get vaccinated once vaccines became available, while others who had previously been willing to vaccinate changed their minds. In this study, we focused on people who did not follow-up on their intentions to (or not to) vaccinate and why.

**Methods** This longitudinal study draws on data from a two-wave nationally representative survey of Americans from July 2020 (T1) and July/August 2021 (T2) to examine the factors that contribute to the COVID-19 vaccination-related intention-behavior gap, using multivariable logistic regression.

**Results** By T2, 52% of previously COVID-19 vaccine-hesitant individuals were vaccinated and 14% of previously pro-vaccine individuals remained unvaccinated. Among the vaccine-hesitant individuals, factors associated with vaccination included higher risk perception, general vaccine acceptance, being informed about the vaccines, endorsing less COVID-19 misinformation, confidence in scientists, and having health insurance. Among the pro-vaccine individuals, factors associated with being unvaccinated included lower risk perception, lower general vaccine acceptance, being less informed about the vaccines, partisan identification, lower confidence in scientists and not having health insurance.

**Conclusion** The study highlights the factors that explain intention-behavior gap in vaccination. We identified what explains individuals' intentions to vaccinate and their actual vaccination behavior one year later, as well as the potential to influence vaccine-hesitant individuals to vaccinate and pro-vaccine individuals from actualizing their vaccination intentions. Understanding these factors is essential in developing evidence-based strategic communications, which can help convince individuals to vaccinate and increase the uptake of COVID-19 as well as other adult vaccines.

**Keywords** Vaccine hesitancy, Health communication, Vaccine acceptance, Adult vaccines, COVID-19, Misinformation

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## Introduction



agree". A vaccine acceptance score was computed as low vs. high score using the median split method [28].

*COVID-19 information exposure* was measured at T1 as *attention to COVID-19 vaccine news* and *COVID-19 misinformation endorsement*. *Attention to COVID-19 vaccine news* was determined by measuring the degree of attention the respondent's paid to COVID-19 vaccine news, on a four-point scale, ranging from "No attention at all" to "A great deal of attention". The variable was dichotomized into low and high attention using the median split method. *COVID-19 misinformation endorsement* was measured based on the respondent's endorsement of a list of 15 COVID-19 myths, rumors, and facts, such as: "only people with underlying health conditions are at risk for COVID-19", "spraying and introducing bleach into your body can protect you against COVID-19" and "wearing face masks can

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#### *Confidence in scientists*

Pro-vaccine individuals who had a great deal of confidence in scientists had lower odds of being unvaccinated compared to individuals who had hardly any confidence in scientists [OR = 0.08, 95% CI = 0.02–0.41] (Fig. 5).

#### *Healthcare access*

Pro-vaccine individuals with health insurance had lower odds of being unvaccinated [OR = 0.13, 95% CI = 0.05–0.35] compared to individuals with no health insurance. (Fig. 5)

Having health insurance remained significantly associ-



people to get vaccinated if they wanted to resume pre-pandemic activities [33].

Despite these numerous measures, by the end of August 2021—when the study was conducted—only 52% of Americans were fully vaccinated [26]. Immunization programs can only be successful in reducing the prevalence and incidence of vaccine preventable diseases if vaccine uptake is high [27]. Our study found that by August 2021, 86% of respondents who we categorized as pro-vaccine in June 2020 and 52% of those who we categorized as vaccine hesitant during the same period were fully vaccinated against COVID-19. This indicates not only that many efforts made in the country were able to encourage most of the pro-vaccine individuals to get

acceptance may further enhance uptake of novel and updated vaccines.

People who are less informed or more misinformed are less likely to follow official health advice [38, 39]. Understandably, mass media, news media, interpersonal sources and social media are critical tools in health promotion and are widely used to create awareness about COVID-19 preventive measures, including vaccines [39–43]. Paying attention to COVID-19 vaccine news is

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**Pro-Vaccine (2020):Unvaccinated (2021)**

**Fig. 6** Odds ratios and 95% Confidence Interval plots for association between social factors and being *unvaccinated* (2021) among pro-vaccine (2020) individuals, after adjusting for gender, age, education, income, and race/ethnicity [OR = Odds Ratio, CI = Confidence Intervals]

response to the pandemic making it a strong predictor of COVID-19 vaccination status, and according to a Kaiser Family Foundation poll, and a National Academies of Sciences Engineering and Medicine's report on *Understanding and Addressing Misinformation about Science*, Republicans make up a disproportionate share of the unvaccinated adult population [3, 9, 12, 49–51]. In our study, among previously pro-vaccine individuals, individuals who identified with the Republican party were more likely to remain unvaccinated. Conservative media has consistently endorsed views that are distrustful of both science as well as scientific expertise and downplayed the risk of COVID-19, which have been found to be associated with lower adoption of COVID-19 preventive measures [39].

Depoliticizing health communication in science is a valuable strategy to prevent public health measures from

becoming politicized. While we acknowledge that public health recommendations often involve value judgments and that it is difficult to eliminate ideological differences or prevent politicization by external actors, certain communication strategies can still help mitigate these effects. For instance, encouraging individuals to receive evidence-based information from experts or trusted figures who are not influenced by political agendas, such as primary healthcare providers or highly respected non-political leaders like religious figures [52]. Policy recommendations incorporating behavioral nudging frameworks could also be beneficial [53, 54]. For example, presenting clear and preemptive facts before misinformation spreads can help “pre-bunk” false claims, reducing the need for debunking, which may inadvertently reinforce misinformation [55, 56]. Additionally, using non-partisan language that transcends ideological

barriers and promotes health and well-being without restricting freedom of choice may enhance message effectiveness [57]. Framing health behaviors as practical



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