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Political and educational dynamics behind the Evangelicals' stance against mask mandates during COVID-19 in the U.S.

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ABSTRACT

This study investigates the mediation effect of conservative political ideology on the relationship between Evangelical identities and attitudes against the mask mandate during COVID-19 in the U. S., using a nationally representative survey administered over three waves from September 2020 to June 2021. We employ a moderated mediation analysis to examine the pathway from Evangelical identity to political conservativeness to anti-mask-mandate attitudes, and the interaction effect between years of education and political ideology. A logistic regression model is used to investigate each path in the mediation analysis. Results suggest that controlling for socio-demographic background, self-identified Evangelical status positively drives resistance to the mask mandate. Additional findings confirm that political orientation is not only an established predictor of the polarized public support of masking, as found in existing studies, but is also a key mechanism by which Evangelical identities positively predict anti-mask-mask attitudes. Finally, a higher level of education is associated with greater political polarization of public opinions on the mask mandate during the pandemic.

1. Introduction

The world was massively changed in late 2019 by the spillover of the SARS Coronavirus-2 into a human population. The subsequent pandemic became known as COVID-19. Since 2019, COVID-19 has resulted in over one million deaths in the United States (U.S.) alone (CDC, 2024). Beyond the high death toll and the general impact of the pandemic on the health and well-being of everyone in the United States, COVID-19 has disproportionately affected people of color and lower-income households (Kochhar and Sechopoulos, 2022; Vasquez Reyes, 2020).

To prevent the spread of the disease, the CDC recommended a suite of nonpharmaceutical interventions such as wearing masks, social distancing, cleaning, disinfecting, and, after it became widely available, vaccination (CDC, 2020). Despite the obvious infeasibilities of establishing causal linkages between mask use and reduced transmission of the virus in a real-world setting via large-scale randomized controlled trials (RCT), there is strong evidence supporting the efficacy of facemasks and respirators (N95/KN95s). SARS Coronavirus-2 had been proven to be transmitted via aerosols in the early stages of the pandemic (Liu et al., 2020), and laboratory experiments repeatedly showed that face masks filter virus-size particles in the air (Brooks, 2021; Pan et al., 2021). The effectiveness of masks was proved with model simulations (e.g., Coclite et al., 2021; Eikenberry et al., 2020) in different contexts of the world (Liang et al., 2020). In a real-world setting, a test-negative case-control study found that among a sample of California residents,

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compared with not wearing masks, wearing either a respirator or a surgical face mask was, on average, associated with lower adjusted odds of testing positive with SARS Coronavirus-2, when vaccination status, socioeconomic background of participants and county population density was controlled for (Andrejko et al., 2022). The CDC's recommendations for mask usage were convincingly supported by scientific evidence.

Despite mounting evidence of mask efficacy, public opinion on masks, however, was divided. The use of masks stood at the center of cultural and ideological debates over the pandemic. Wearing a face mask became a symbolic act that represented a profound transformation in how people perceive themselves, their daily interactions, and their expression of subjectivity (Erni and Striphas, 2021). Great variation existed in identity-based mask-wearing behaviors even when local mask mandates were accounted for (Milosh et al., 2021; Young et al., 2022). It is, therefore, both of great practical and theoretical importance to investigate key mechanisms that predict public attitudes with mask recommendations, mandates and the scientific paradigm behind.

Existing studies have separately identified Evangelical Christianity and politically conservative identities as powerful predictors of mask resistance in the US (Alder and Schaeublin, 2020; DeMora et al., 2021; Gonzalez et al., 2021; T. D. Hill et al., 2020). However, it remains underexplored how the complexities of both identities (Sutton et al., 2020) may collectively explain individual attitudes. Acknowledging the nuanced nature of human motivations, in this study, we seek to understand how one strain of conservatism may serve as an intermediate step in explaining the effect of the other on mask resistance. Given how politically conservative ideology became particularly appealing to the Evangelicals during the Trump administration (Perry et al., 2020), in this study, we specifically investigate a relationship between Evangelical identity and attitudes against mask mandates under COVID-19 that is possibly mediated by political conservatism. Based on existing studies about the existence of debates around contentious scientific topics that are not only partisan-based, but the magnitude of the gap also grows with educational attainment, we further investigate how the dynamic relationship of Evangelical identity and politically conservative identities on mask attitudes examined in this study might differ by the years of education received. These motivations lead to a moderated mediation analysis guided by the following research questions.

RQ 1. How might Evangelical identity affect attitudes against mask mandates under COVID-19?

RQ 2. Can political conservatism explain the effect of Evangelical identity on anti-mask-mandate attitudes?

RQ 3. How might the indirect effect of Evangelical identity on anti-mask-mandate attitudes via political ideology differ by years of education?

A visual presentation of the modeled relationship of the above questions is presented in section (3) Material and Methods, as Fig. 1. Through investigating these questions, we provide evidence that political conservatism, as operationalized by the support for Trump in the 2016 U.S. presidential election, channels the pathway from an Evangelical identity to a stance against mask mandates. It is also the first to test the interaction between education and the strength of political polarization in a public health debate, a relationship previously mostly identified with issues related to epistemological debates, such as human evolution and the Big Bang Theory (Drummond and Fischhoff, 2017; Hamilton, 2011).

The remainder of the paper is divided into four sections. In section (2) we summarize the existing studies this research builds upon: conservative religiosity, Evangelicalism, and the resistance of masks and mask mandates; the relationship between Evangelical identity, conservative political ideology, and the polarization of masks under COVID-19; and the multiplicative relationship between political polarization and education on science topics. This section also outlines the key hypotheses generated from the literature. In section (3) we introduce the survey dataset employed (the U.S. National Science Foundation-Sponsored Behavioral Change COVID-19 (BCC19) Survey), the model design, the variables of interest, and present descriptive statistics of the variables. In Section (4), we discuss findings from the models and the moderated mediation analysis. Section (5) reports robustness checks of the findings. In the final section (6), we discuss the implications and limitations of this research, and conclude the study.

2. Background and hypotheses

In this section, we lay out the literature, our research questions, and how they relate to our three key hypotheses. These hypotheses, if supported, suggest the mechanisms by which Evangelical identities may lead to politically conservative views, and subsequently increase resistance to mask-wearing mandates.

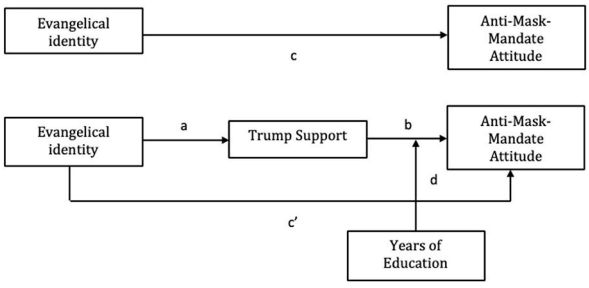

Fig. 1. Proposed moderated mediation model.
Source: Authors' illustration.

2.1. Religious conservatism, Evangelicalism, and mask-wearing under COVID-19

Religiosity plays a central role in America's growing polarization (Perry, 2022). Studies of the relationship between religious conservatism and mask-wearing attitudes under COVID-19 mostly reported a negative relationship. A major factor explaining the conservative anti-mask attitudes is the group's distrust of the science paradigm (Alder and Schaeublin, 2020; Burge, 2020a, 2020b; Evans, 2013; Gauchat, 2008; T. D. Hill et al., 2020; Perry, 2022).

In the mid-20th century, Evangelical Protestants (used interchangeably with "Evangelical Christians" and "Evangelicals" in this research) emerged as a conciliatory movement between fundamentalism and mainline Protestantism (Smith, 2006). As one of the main groups categorized by scholars as "conservative Protestants" (Evans, 2011; Woodberry and Smith, 1998), Evangelical Protestants believe in Biblical prophecies on an approaching apocalypse and the Second Coming of Christ (Alder and Schaeublin, 2020). Sticking to biblical literalism, the Evangelical group evaluates the credibility of scientific information based on its perceived alignment with scriptural teachings (Hill et al., 2020).

Research has identified a growing moral conflict between conservative Protestants and scientists during the past decades (Evans, 2013). The conflicts between religious conservativism and science evolved beyond the epistemological debates about the truth of the world, to power struggles between the two as social institutions (Evans and Evans, 2008). The best evidence suggested that science and religious fundamentalism clash as world views, with survey data showing that individuals believing in either scientific or traditional religious paradigms exhibit contrasting opinions in a series of social, political, and economic statements (Noy and O'Brien, 2016). During COVID-19, research found distrust of the scientists' knowledge from conservative Protestants and Catholics (Evans and Hargittai, 2020). These studies collectively showed that conservative religious beliefs may serve as an ideological foundation against science and public health guidelines under COVID-19.

Another related explanation for the Evangelicals' reluctance to take precautionary actions against the virus is their perceived lack of control of the matter and their beliefs in the nearing of the apocalypse (Alder and Schaeublin, 2020). This holds for the general religious population in the U.S. as well. Polls showed that among religious Americans, two-thirds believed that the virus was "God telling humanity to change the way we are living" (Fowler, 2020). A trust in God was believed to protect religious Americans from COVID-19 (Fowler, 2020; Schlor and Fingerhut, 2020). Minton et al. (2022) found that religiosity is associated with reduced prosocial behavior because of a perceived lack of personal control over the crisis. Schnabel and Schieman (2022) reached a similar conclusion that the highly religious groups, especially the Evangelicals, saw less of a crisis in COVID-19, suffered from less distress, and were more reluctant to support public health restrictions aiming to contain the spread of the disease.

By fall 2020, most U.S. regions have implemented mandates that required universal masking in public places (Huang et al., 2022). Mask mandates became controversial among the conservative religious group as an infringement of personal and religious freedom. Kahn (2022) described mask-wearing resistance as "semiotic expressions of hate" (1). Under such "hatred", mask mandates were regarded as an instrument of social control, that jeopardized the "freedom" of revealing one's face (Kahn, 2022). Individual constitutional rights were viewed to conflict with indoor masking requirements, the restrictions on indoor assembly and attendance of religious services, and the possible police enforcement of such mandates (Flood et al., 2020; Fowler, 2020). In a telling anecdote, a conservative Christian father of two teens who refused to wear masks at school reportedly claimed "The Bible says we're made in the image of God and Satan tries to cover that up. A mask is a sign of oppression" (Cherry, 2021).

Finally, conservative religious institutions and schema have effectively indoctrinated anti-mask views through religious practices and leadership (Hill et al., 2020; Schnabel and Schieman, 2022). Religious leaders are found to have played a prominent role in impacting public attitudes and behaviors under COVID-19 in an international context (Essa-Hadad et al., 2022). The influence of religious leadership in the U.S. is found to be no less substantial. An Evangelical Pastor, Pastor Locke of the Global Vision Bible Church in Mount Juliet, Tennessee, for example, believed that COVID-19 was a hoax, and threatened to ban mask-wearing parishioners from his service amid the high transmission of the Delta variant in the state (Peiser, 2021). Hill et al. (2020) named a few comparable anti-mask cases of US conservative religious leadership including Pastor Andrew (USA Christian Church, California), Reverend Curtis (Havre Assembly of God Church, Montana), Bishop Glenn (New Deliverance Evangelistic Church, Virginia), Pastor Howard-Browne (The River at Tampa Bay Church, Florida), and others.

Based on the existing academic discussions, we argue that from belief system to practice, Evangelicalism, representing a stream of conservatism Protestantism, is expected to lead to resistance to mask-wearing mandates and recommendations, proposing the following hypothesis.

Hypothesis 1. Having an Evangelical identity directly promotes an attitude against mask mandates under COVID-19.

2.2. Evangelicalism, politically conservative ideology, and political polarization of masks

Contemporary American political conservatism is an ideology opposed to "big government" and taxation, emphasizing liberty and personal freedom (Gonzalez et al., 2021). The group with stable politically conservative identities is more inclined to distrust scientific authority compared to the swing group, perceiving scientists as politically biased (Mann and Schleifer, 2020). Under the COVID-19 pandemic, politically conservative Republicans held more negative views of scientific findings and public health protocols. They were more inclined to believe that efforts to contain the spread of the disease were politically motivated (Hill et al., 2020). Compared to the liberals, conservatives showed stronger resistance to masking recommendations. A media report citing an analysis of poll data in mid-2020 showed that 75% of Democrats reported wearing masks in public places, while the percentage was greatly lower at 53% for Republicans (Lauter, 2020). Studies confirmed that in the U.S., partisanship robustly and powerfully predicts mask use (Albrecht,

2022; Boykin et al., 2021; Flaskerud, 2020; Gonzalez et al., 2021; Howard, 2022; Kahane, 2021; Milosh et al., 2021; Perry et al., 2020). In this study, we operationalized the measurement of political conservatism as the stated support for the Republican party leader, then-President Donald Trump. Support for Trump so consistently represents political conservatism that it is treated as a valid indicator of this dimension in the US (Gonzalez et al., 2021; T. Hill et al., 2021).

Conservative Protestants have strongly aligned with contemporary US political conservatives. This alignment was further strengthened during the Trump administration. President Trump had targeted outreach to the conservative Christians. In his 2016 campaign, for example, Trump made the promise that "(with) A Trump administration, our Christian heritage will be cherished, protected, defended, like you've never seen before" (Politico, 2016). His campaign strongly appealed to the White Christian rural population that hoped to gain power against pluralist democracy (Rubin, 2022). Related research termed the combination of religious and political conservatism as "Christian nationalism", representing "a hyper-partisan and ultra-conservative ideology that has already been shown to lower Americans' trust in science and scientific expertise … promote a view of (conservative Christian) Americans as God's chosen … (and) bind them to siding with Trump" (Perry et al., 2020, p. 406). It was estimated that around half of the US Evangelicals are also Christian nationalists (Whitehead and Perry, 2020). Research identified Christian nationalism as positively associated with COVID-19 vaccine hesitancy, and negatively associated with vaccine uptake (Corcoran et al., 2021). Patriot church is an example of Christian Nationalist ideology, convening a group that not only believes that America should be a Christian country but also is fervently engaged in seeking political power to rebuild the country around its Christian faith (Bailey, 2020).

The political conservatives' anti-big government and anti-science stances align with the conservative Protestants' world views. Trump's policy aim of pruning the federal workforce ("drain the swamp") spoke to the core conservative principle of constraining government power and protecting personal freedom (Gonzalez et al., 2021, p. 2369; Hudson, 2018). Anti-science in its rhetoric and policies, the Trump administration proposed multiple budget cuts to agencies such as the National Institutes for Health and the Environmental Protection Agency (Frickel and Rea, 2020). In the early stages of COVID-19, the Trump administration understated the seriousness of the virus, calling it fraudulent, fake, and a hoax fabricated by the "deep state" (Bunch, 2020; Gonzalez et al., 2021; Van Bavel, 2020). Repeatedly during his presidency and campaign, Trump attacked the official charged with coordinating the government response to the pandemic, Anthony Fauci, Director of the National Institute Allergy and Infectious Diseases, on coronavirus topics, calling him "a disaster" and "an idiot" (CNN Newsroom, 2020).

In congruence with his gestures downplaying the virus, Trump showed reluctance and mocked Joe Biden, the then-Democratic nominee, for wearing masks despite public health guidelines (Cathey, 2020). In an extensive interview with the Wall Street Journal, Trump expressed that people wore masks "not as a preventative measure but as a way to signal disapproval of him" (Bender, 2020; Scott, 2020). A month later, he wore a mask in public for the first time at Walter Reed and called the act "patriotic," sparking online discussions and positive sentiments toward mask use (Milosh et al., 2021). Trump's mixed reactions toward masks have undoubtedly created misconceptions and encouraged resistance towards masking (Sami, 2020). His shifted rhetoric and actions on mask use catalyzed masks as a political symbol that further divided public opinions under the background of the bipartisan pandemic.

While scholars often agree that Evangelicalism and political conservativeness are aligned in opposition to mask use under COVID-19 for the reasons mentioned above, there have been no studies so far that empirically examined if and how much political orientation may explain the anti-science stance of the Evangelical group under COVID-19. In other words, different dimensions of conservatism coexist, but how one aligns with and explains the other against the scientific paradigm remains understudied. Trump's anti-science stance during COVID-19 had not only appealed to his conservative supporters who distrust scientists but also further aggravated the cultural and partisan polarization among Americans on issues with the pandemic. To White Evangelicals, for example, the Trump administration became a more reliable information source than public health officials or the media regarding COVID-19 (Burge, 2020a). It has also been shown that the Evangelicals were less fearful of the pandemic not because of faith, but because they trusted in Trump (Burge, 2020b). The study of Gonzalez et al. (2021) using US county-level data found that the relationship between the percentage of Evangelicals in the population and mask resistance weakened when the Trump effect was adjusted for. The evidence here suggests the need to empirically examine if politically conservative ideology mediates the pathway from Evangelicalism to an anti-mask stance on an individual level. It is also worth distinguishing mask use from mask mandate – the latter carrying a stronger political implication. This leads to the following hypothesis.

Hypothesis 2. Adherence to politically conservative ideology mediates the association between Evangelical identities and attitudes against mask mandates.

2.3. Interaction effect between political ideology and education

Scholars have identified an interaction effect between political ideology and educational achievement over disputed science and environment topics such as climate change, human evolution, and the Big Bang Theory (Drummond and Fischhoff, 2017; Hamilton, 2008, 2011; Hamilton et al., 2010, 2015; Hamilton and Saito, 2015; Malka et al., 2009; McCright, 2011). This body of work agreed that contentions over these topics are not only ideologically based, but also differ along an educational gradient. For example, studies by Hamilton et al. using different survey data have consistently found the polarization between the Democrats and Republicans on issues such as anthropogenic climate change grows with education (Hamilton, 2008; Hamilton et al., 2010). Debates on masking and other public health measurements under COVID-19 are similarly ideologically mapped, but few have examined whether an education interaction effect exists here.

Theoretical frameworks in human psychology offer several explanations for the interaction effect between political ideology and education. One category, as summarized by Drummond and Fischhoff (2017), involved motivated reasoning that the better educated

are more capable of selecting the information that speaks to their prior beliefs, which may lead to *confirmation bias* (Brulle et al., 2012; Hamilton et al., 2015; Kahan et al., 2012; Klayman and Ha, 1987; Kunda, 1990). The other explanation was the *overconfidence* (Drummond and Fischhoff, 2017; Moore and Healy, 2008) of the more knowledgeable group. A more recent study by Light et al. (2022) found that on questions with clear scientific consensus and COVID-19 mitigation measures, the group showing the strongest objection commanded the lowest levels of actual knowledge but the highest level of confidence in their knowledge. On matters as politically polarized as precautionary measures under COVID-19, more education is possibly associated with a higher assessment of subjective knowledge, leading to more extreme views regardless of the actual content of the knowledge.

Based on these existing studies, we propose to test a possible interaction effect of education on the mediated relationship between Evangelical identities and anti-mask-mandate attitudes, coming up with the following hypothesis.

Hypothesis 3. An educational difference exists in the indirect effect of Evangelical identities on attitudes against mask mandates through political conservatism, where the politically conservative higher educated group show stronger anti-mask-mandate attitudes than the lower educated.

3. Materials and methods

3.1. Data and measurements

We use a nationally representative sample of the over-18 population in the United States from the U.S. National Science Foundation-Sponsored Behavioral Change COVID-19 (BCC19) Survey (Jones et al., 2022) to address the research questions in this study. The BCC19 project aimed at studying the spread of COVID-19 coupled with behavioral changes that included as examples, social distancing, mask-wearing, social gathering, and supply hoarding to understand how US individuals interpret and react to the perceived risk of disease amid the pandemic (Jones, 2023). Selected research that employed this dataset includes a study on population behavioral dynamics related to COVID-19 (Moya et al., 2020), as well as studies on combined contagion of behavior and COVID-19 for specific populations (Richardson et al., 2021; Smaldino and Jones, 2021).

The project survey was collected longitudinally by Ipsos in three waves, with a main survey period for the first wave from 8/31/2020 to 9/15/2020; for the second wave, 11/12/2020 to 11/01/2021; for the third wave, 5/21/2021 to 6/13/2021. The general population survey respondents were recruited using KnowledgePanel, a large online panel platform with address-based sampling (ABS) techniques. The KnowledgePanel survey response rate is reported to be 60% in general (Ipsos, 2020). For this survey, one adult from households representing the US total population was contacted by email to answer the questionnaires via the Internet. Sample weights were derived based on geo-demographic indicators of gender, age, race/ethnicity, education, census region, household income, home ownership status, metropolitan area, and Hispanic origin. Design weights were derived based on sampling selection and nonresponse, with information on geographic distributions of the study-specific population obtained from the U.S. Census Bureau's Current Population Survey and American Community Survey. The final weights of this study were produced with calibration methods, often referred to as raking (Lumley, 2010). The original survey datasets contain 1421 observations for wave one, 1186 observations for wave two, and 1010 observations for wave three. We use a balanced panel dataset containing respondents who participated in all three waves which yielded 2934 observations.

Having an attitude against the mask mandate under COVID-19 is treated as the outcome variable. It is derived from the following survey question: "Given the current state of the world, mask-wearing should be mandatory in my community when people interact within 6 ft (e.g., within stores)." Responses are coded so that lower scores indicate "strongly agree" (2) and higher scores indicate "strongly disagree" (6). We re-code the variable by making it binary, where 0 indicates "strongly agree" or "somewhat agree", and 1 otherwise, representing a combination of a lack of support ("neither agree or disagree") and negative attitudes ("somewhat disagree" and "strongly disagree") toward mask mandates.

Self-identified Evangelical status is measured by the following question: "Would you describe yourself as a born-again or evangelical Christian?" It is binary with 1 representing "yes", and 0 "no".

We control for the proposed mediator, support for Trump, the proposed moderator, years of education, and additional covariates in the modeling stage. Support for Trump is measured by a question from wave one asking which candidate the respondent chose for the 2016 presidential election. The variable assumes 1 if the response is Trump and 0 otherwise. Years of education are derived from the variable of the highest degree received.[1] Additional covariates include the respondent's age, ethnicity, sex, urbanicity, marital status, and income. Variable ethnicity contains four categories: "White, Non-Hispanic", "Black, Non-Hispanic", "Hispanic", and "Other". Urbanicity assumes a value of 1 when the respondents reside in urban or suburban areas, and 0 if they are rural. Sex (female) and marital status (married) are also binary. Additionally, we control for annual household income (catagorical) as the mean of the bucket range chosen by survey respondents.

Finally, in order to distinguish an Evangelical identity from general religiosity, we control for self-measured religiosity and frequency of attending religious practice prior to COVID-19. Religiosity is derived from the question, "Do you consider yourself a religious person?" It is binary with 1 representing "yes", and 0 representing "no". The frequency of religious practice is measured by the question "Prior to COVID-19, how often did you attend religious services?" Respondents select from the following options "Weekly or more", "Once or twice a month", "A few times a year", "Seldom", and "Never". It is coded numerically so that 0 indicates "Never", and the value increases by 1 with the increased level of religious practice. Because we run pooled regression, we control for survey waves using dummy variables, to account for the possible confounders that changes across waves but remain constant within individuals.

Table 1 presents the weighted estimates of the focal dependent and independent variables and the covariates.[2]

3.2. Methods

Fig. 1 presents the study model as described in this section.

We employ logistic regression to explore each pathway from an Evangelical identity to an attitude against mask mandate via political conservatism (Trump support). Specifically, in our analysis, we adopt a four-stage modeling process to test the total, indirect, and direct effects of Evangelical identity on mask mandate resistance through support for Trump, as specified in Fig. 1, following an illustration adopted by Yoon et al. (2019).

Eq (1) describes the Total-Effect Model (c) where the logit of the probability of having an anti-mask-mandate attitude (m_{it}) is modeled against the focal independent variable Evangelical identity (E_{it}) without adjusting for the Trump effect. E_{it} represents the Evangelical identity of respondent i in wave t; The proposed moderator, years of education (EDU_{it}), is included as one of the controls in this model; $\boldsymbol{C_{it}}$ represents a vector of control variables: age, ethnicity, sex, urbanicity, marital status, household income, general religiosity, and attendance of religious practice prior to COVID-19. Two binary variables of $W2_i$ and $W3_i$ are added to control for wave-fixed effects. ε_{it} represents the error term.

$$\text{logit}(m_{it}) = \beta_0 + \beta_1 E_{it} + \beta_2 EDU_{it} + \boldsymbol{\gamma C_{it}} + \delta_2 W2_i + \delta_3 W3_i + \varepsilon_{it} \quad \text{Eq1}$$

In the second stage, the Mediator Model, we model the effect of Evangelical identity on the hypothesized mediator (relationship a) where t_i in this stage is the probability of supporting Trump in the 2016 presidential election for respondent i. Note that this variable is independent of survey wave t. The second model contains the same set of independent variables and control variables on the right-hand side of the equation as Eq (1).

$$\text{logit}(t_i) = \beta_0 + \beta_1 E_{it} + \beta_2 EDU_{it} + \boldsymbol{\gamma C_{it}} + \delta_2 W2_i + \delta_3 W3_i + \varepsilon_{it} \quad \text{Eq2}$$

With the third stage, the outcome variable of interest, the probability of having an anti-mask-mandate attitude (m_{it}) is modeled against the same set of predictors, plus the mediator variable, support for Trump (T_i) in addition to the control variables listed in Eq (1) and Eq (2). In this Direct-Effect Model, we test the Evangelical identity-adjusted effect of political conservatism on having an attitude against mask mandate (b), and the political conservatism-adjusted effect of Evangelical identity on having an anti-mask-mandate attitude (c').

$$\text{logit}(m_{it}) = \beta_0 + \beta_1 E_{it} + \beta_2 EDU_{it} + \beta_3 T_i + \boldsymbol{\gamma C_{it}} + \delta_2 W2_i + \delta_3 W3_i + \varepsilon_{it} \quad \text{Eq3}$$

Table 1
Weighted estimates of main variables.

	Mean	SE	Min	Max	Count
Outcome Variable					
Anti Mask Mandate Attitude	0.33	0.01	0	1	2934
Independent variable					
Evangelical	0.28	0.01	0	1	2934
Mediator					
Trump Support	0.33	0.01	0	1	2934
Moderator					
Years of Education	14.07	0.06	0	22	2934
Controls					
Age	49.44	0.36	18	89	2934
Married	0.56	0.01	0	1	2934
Household income ('000)	94.07	1.41	2.5	300	2934
Female	0.52	0.01	0	1	2934
Urban	0.82	0.01	0	1	2934
Ethnicity					
White, Non- Hispanic	0.65	0.01			2934
Black, Non-Hispanic	0.10	0.01			2934
Hispanic	0.16	0.01			2934
Other	0.09	0.01			2934
Religiosity	0.54	0.01	0	1	2934
Religious Practice	1.76	0.03	0	4	2934

Source: Behavior Change COVID-19 Survey, Wave One, Wave Two, and Wave Three.

A mediation pathway establishes if the total effect (c), the indirect effects (a), and (b) are all found to be significant, and the magnitude of the direct effect (c') is smaller than that of the total effect c ($|c'| < |c|$) (Yoon et al., 2019). The mediation analysis in this study relies on the assumption of sequential ignorability (Imai et al., 2010) that the direct and indirect relationships specified in the above model setup have no uncontrolled confounders.[3]

At the final stage, a Moderated-Mediation Model, we model the effect of the same set of predictors as Eq (3) on the probability of having an attitude against mask mandate, controlling for, in addition, the interaction between the proposed mediator Trump support (T_i) and the moderator years of education (EDU_{it}). β_4 will show how education interacts with the effect of political conservatism (d).

$$\text{logit}(m_{it}) = \beta_0 + \beta_1 E_{it} + \beta_2 EDU_{it} + \beta_3 T_i + \beta_4 T_i EDU_{it} + \boldsymbol{\gamma C_{it}} + \delta_2 W2_i + \delta_3 W3_i + \varepsilon_{it} \quad \text{Eq4}$$

4. Results

Results of logistic regressions of the Total-Effect model, the Mediator model, the Direct-Effect model, and the Moderated-Mediation model are presented in Table 2. Standard errors are clustered, to adjust for within-group (in this case, the individual-level) serial correlations.

Model 1 presents the results of the Total-Effect model testing if an Evangelical identity positively predicts an attitude against mask mandates without adjusting for the Trump effect. Controlling for socio-demographic background, the population self-identified as Evangelicals on average has a 62.4% higher odds of going against mask mandates compared with the non-Evangelical group. Neither general religiosity nor religious attendance is found to significantly relate to an anti-mask attitude. Looking at the average marginal effect, the predicted probability for the Evangelical group is 0.42, 31.2% higher than the non-Evangelical group's predicted probability of going agains the mask mandates of 0.32. Model 2 presents the Mediator Model that tests the effect of having an Evangelical identity on the logit of the mediator, Trump support. With the Mediator Model, controlling for socio-demographic covariates, the Evangelical group shows on average 121.2% higher odds of supporting Trump, compared with the non-Evangelical group. The predicted average marginal effect of having an Evangelical identity on supporting Trump is 0.16 ($p < 0.001$). As expected, populations with higher

Table 2
Logistic regression results (odds ratios and 95% confidence intervals).

	Dependent Variable							
	Mask Mandate Resistance (1)		Trump Support (2)		Mask Mandate Resistance (3)		Mask Mandate Resistance (4)	
Predictors	Odds Ratio	CI	Odds Ratio	CI	Odds Ratio	CI	Odds Ratio	CI
Wave two	0.95	0.84–1.08	1.00	1.00–1.01	0.95	0.83–1.08	0.94	0.82–1.08
Wave three	3.55[c]	3.05–4.13	1.01[b]	1.00–1.02	3.98[c]	3.37–4.71	4.02[c]	3.40–4.76
Evangelical	1.62[b]	1.19–2.22	2.21[c]	1.52–3.23	1.34.	0.98–1.83	1.35.	0.99–1.83
Trump Support					4.20[c]	3.23–5.46	0.57	0.17–1.96
Years of Education	0.91[c]	0.87–0.96	0.89[c]	0.84–0.95	0.94[b]	0.90–0.98	0.89[c]	0.84–0.94
Age	0.99[c]	0.98–0.99	1.02[c]	1.01–1.03	0.98[c]	0.97–0.99	0.98[c]	0.97–0.99
Ethnicity: Hispanic	1.46	0.75–2.81	8.89[c]	2.81–28.12	0.95	0.48–1.88	0.91	0.46–1.81
Ethnicity: Non-Hispanic White	2.33[b]	1.35–4.04	21.14[c]	7.36–60.73	1.23	0.69–2.22	1.29	0.71–2.33
Ethnicity: Other	1.39	0.69–2.80	15.24[c]	4.84–47.96	0.79	0.38–1.63	0.87	0.42–1.80
Female	0.70[b]	0.55–0.89	0.63[b]	0.46–0.85	0.78[a]	0.61–0.99	0.78[a]	0.62–1.00
Urban	0.68[b]	0.52–0.89	0.79	0.56–1.10	0.71[a]	0.54–0.93	0.70[a]	0.54–0.92
Married	1.07	0.82–1.39	1.17	0.83–1.63	1.03	0.79–1.36	1.05	0.80–1.38
Household Income ('000)	1.00[b]	1.00–1.00	1.00	1.00–1.00	1.00[a]	1.00–1.00	1.00[a]	1.00–1.00
Religiosity	1.11	0.82–1.52	1.33	0.93–1.89	1.02	0.75–1.40	1.01	0.74–1.38
Religious Practice	1.09.	0.98–1.20	1.22[b]	1.08–1.37	1.03	0.93–1.15	1.03	0.93–1.14
Trump Support X Education							1.15[b]	1.06–1.25
Constant	0.99	0.38–2.53	0.03[c]	0.01–0.11	1.18	0.45–3.09	2.42	0.84–6.97
Observations	2934		2934		2934		2934	
Log Likelihood	−1684.57		−1628.90		−1574.51		−1565.37	
Akaike Inf. Crit.	3399.1		3287.8		3181.0		3164.7	

Note: .p < 0.1.
[a] p < 0.05.
[b] p < 0.01.
[c] p < 0.001.
Sources: Behavior Change COVID-19 Survey, Wave One, Wave Two, and Wave Three.

educational attainment, being female (compared with male) and urban (compared with rural) are, on average, less likely to support Trump. Age is related to slightly stronger support for Trump. Compared to the non-Hispanic Black population, all other three ethnicities show greater alliance with Trump, with the non-Hispanic White population reporting the highest odds ratio of 21.14. The frequency of religious practice is also found to significantly and positively predict Trump support.

Model 3 reports the results of the Direct-Effect Model which measures the direct effect of having an Evangelical identity on the logit of having an anti-mask-mask attitude, and the indirect effect through the support for Trump without adjusting for a possible Trump-education interaction effect. Controlling for individual socioeconomic backgrounds, results consistently confirm a positive and significant relationship between an Evangelical identity and an attitude against mask mandates. Specifically, compared to the non-Evangelical group, the population who self-reported to be Evangelical has a 34.0% higher odds of not supporting mask mandates, with a predicted average marginal effect of 0.05. Note that the effect of Evangelicalism here in the Direct-Effect model is smaller than the effect as found in the Total-Effect model ($|c'| < |c|$) but is still substantial and marginally significant at the level of $p < 0.1$. Results of Models 1 to 3 confirm that support to Trump partially explains the association between Evangelical identities and attitudes against mask mandates.

Results of bootstrapped mediation analysis confirm the support for Trump as a salient mechanism in explaining the Evangelical group's stance against mask mandates, the proportion of the total effect of Evangelical identities on the outcome that is explained by the group's support for Trump is 42.4%, contributing to a substantial share. In other words, by politicizing mask-wearing as a bipartisan debate, political conservatism plays a prominent role in explaining the Evangelical group's stance against mask mandates. The direct effect of Evangelical identities alone contributes to 57.6% of the total effect.

Model 4, the Moderated-Mediation Model builds on top of Model 3, and additionally controls for the interaction between Trump support and the level of education. Having an Evangelical effect shows a consistently positive effect of an odds of 34.7% higher than the non-Evangelicals on the rejection of mask mandates, the result being marginally significant at the level of $p < 0.1$. Consistent with Hypothesis 3, The Moderated-Mediation Model finds that the political polarization in public mask-wearing attitudes grows with levels of education. Specifically, controlling for Evangelical identity, general religiosity, frequency of religious practice, and other socio-demographic covariates, for non-Trump supporters, a one-year increase in education, on average, reduces the odds of having an anti-mask-mandate stance by 11.0%. For Trump supporters, however, a one-year increase in education is on average associated with a 2.5% higher odds of rejecting mask mandates. The relationship can be clearly detected in Fig. 2 below, where the gap in predicted probabilities between the Trump and the non-Trump groups grows with years of education.

As an additional way to illustrate the moderation effect of years of education on the indirect effect of Evangelical identity against mask mandates via support for Trump, we create two explicit levels of years of education variables at one standard deviation above and below the sample mean ($\bar{x}_E \pm s_E$). We then conduct a test for differences in the predicted probability of rejecting mask mandates by Trump support, fixing the level of education at these two levels (Blair and Demos, 2017; Mize, 2019; Tingley et al., 2014). With this step, we test Hypothesis 3 to evaluate the indirect effects of Evangelical identities on anti-mask-mandate attitudes at two different levels of the moderator (Hayes, 2013): the highly educated group with years of education one standard deviation above the mean (17.0 years), and a lower educated group with years of education one standard deviation below the mean (11.0 years).

As presented in Table 3, we find that education moderates the indirect effect of Evangelical identities on mask-mandate rejection through political conservatism. Specifically, the higher educated Trump supporters have a significantly higher probability of rejecting mask mandates (0.537) than the lower educated Trump supporters (0.505; $\Delta = 0.032$; $p < 0.001$). For the no-Trump groups, the probability of rejecting mask mandates is significantly lower for the higher educated group (0.187) than the lower educated group (0.299; $\Delta = -0.112$; $p < 0.001$). The effect of education – with the higher educated better motivated and more confident – on rejecting mask mandates is not only larger, but also in opposite directions for Trump supporters and non-Trump supporters (second

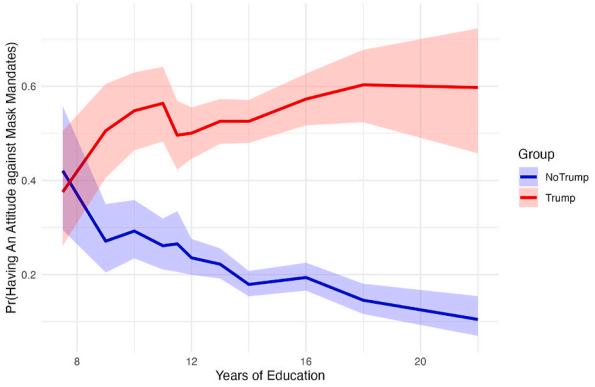

Fig. 2. Predicted probability of rejecting mask mandates by education and Trump support.
Note: Figures are derived from models shown in Table 2, with covariates held at their observed values in the dataset before being averaged (see e.g., Mize (2019)). Data points for education levels below 7.5 years were excluded due to insufficient observations within the Trump group at these lower levels of education.
Sources: Behavioral Change COVID-19 Survey, Wave One, Wave Two, and Wave Three

Table 3
Probability of rejecting mask mandates by education and Trump support with test of interaction effect ($N = 2934$).

	Pr (Having An Attitude against Mask Mandates)	First Differences (Average Marginal Effect)	Second Difference
Higher Educated Trumpers	0.537		
	(0.003)		
Lower Educated Trumpers	0.505	$0.537 - 0.505 = 0.032$[a]	
	(0.003)		
Higher Educated Non-Trumpers	0.187		$0.032 - (-0.112) = 0.144$[a]
	(0.002)		
Lower Educated Non-Trumpers	0.299	$0.187 - 0.299 = -0.112$[a]	
	(0.003)		

Note: Standard errors of the predictions in parentheses.
[a] $p < 0.001$, two-tailed tests.
Source: Behavioral Change COVID-19 Survey, Wave One, Wave Two, and Wave Three

Table 4
Ordered logit analyses results (log odds and standard errors).

	Dependent Variable		
	Mask Mandate Resistance (1)	Mask Mandate Resistance (3)	Mask Mandate Resistance (4)
Wave Two	−0.130[b]	−0.149[b]	−0.145[b]
	(0.049)	(0.053)	(0.053)
Wave Three	1.426[c]	1.576[c]	1.585[c]
	(0.064)	(0.071)	(0.071)
Evangelical	0.539[c]	0.358[a]	0.359[a]
	(0.145)	(0.142)	(0.141)
Trump Support		1.475[c]	−0.485
		(0.123)	(0.584)
Years of Education	−0.083[c]	−0.056[b]	−0.104[c]
	(0.020)	(0.020)	(0.023)
Age	−0.013[c]	−0.021[c]	−0.021[c]
	(0.003)	(0.004)	(0.004)
Ethnicity: Hispanic	0.370	−0.039	−0.073
	(0.264)	(0.264)	(0.262)
Ethnicity: Non-Hispanic White	0.971[c]	0.372.	0.413.
	(0.216)	(0.223)	(0.224)
Ethnicity: Other	0.512.	0.021	0.116
	(0.289)	(0.291)	(0.295)
Female	−0.316[b]	−0.198.	−0.191.
	(0.111)	(0.110)	(0.110)
Urban	−0.404[b]	−0.359[b]	−0.370[b]
	(0.129)	(0.127)	(0.127)
Married	0.139	0.110	0.126
	(0.123)	(0.126)	(0.126)
Household Income ('000)	0.002[a]	0.002[a]	0.002[a]
	(0.001)	(0.001)	(0.001)
Religiosity	0.147	0.104	0.093
	(0.139)	(0.139)	(0.138)
Religious Practice	0.082.	0.025	0.022
	(0.046)	(0.048)	(0.047)
Trump Support X Education			0.140[c]
			(0.040)
_Cut 0|1	−0.459.	−0.590[b]	−1.235[c]
	(0.278)	(0.284)	(0.313)
_Cut 1|2	0.390	0.331	−0.308
	(0.277)	(0.283)	(0.311)
_Cut 2|3	1.022[c]	1.017[c]	0.382
	(0.278)	(0.284)	(0.312)
_Cut 3|4	1.564[c]	1.607[c]	0.973[b]
	(0.280)	(0.286)	(0.314)
Observations	2934	2934	2934
Log Likelihood	−3731.42	−3571.47	−3558.82
Akaike Inf. Crit.	7498.83	7180.95	7157.65

Note: .p < 0.1.
[a] p < 0.05.
[b] p < 0.001.
[c] p < 0.001.
Sources: Behavior Change COVID-19 Survey, Wave One, Wave Two, and Wave Three

difference $0.032 - (-0.112) = 0.144$; $p < 0.001$).

Directions of other sociodemographic control variables are proved to be as expected. A one-year increase in age lowers the odds of having an anti-mask-mandate attitude by 2.2%, reflecting the elderly population's stronger sense of self-protection given their increased vulnerability to the virus (e.g., Bonanad et al., 2020). Compared to males, females have lower odds of 21.6% of rejecting mask mandates. Compared to rural residents, the population living in urban and suburban areas has a 29.6% lower odds of rejecting mask mandates. Household income ('000) shows a slightly positive effect on having a stance against mask mandates of an odds ratio of 1.002 ($p < 0.05$). No statistically significant differences in the odds of having anti-mask-mandate attitudes are observed among different races and ethnicities, between the married and the not married group, between the generally religious and the non-religious group, or with different frequencies of attending religious practice before COVID-19. The Moderated-Mediation Model yields the best performance both in terms of the log likelihood and the AIC values (see Table 2).

5. Sensitivity analysis

A robustness check is run to test if the findings of this research stay consistent with different grouping methods of the outcome variable, attitude on mask mandates. Specifically, this variable is kept with the following categories: 0 = Strongly agree, 1 = Somewhat agree, 2 = Neither agree nor disagree, 3 = Somewhat disagree, and 4 = Strongly disagree. Ordered logit regressions are employed with the same set of predictors. Table 4 below reports results from the ordered logit analyses.

Results of the ordered logit regressions are consistent with findings from the binary logit models. Controlling for socio-demographic backgrounds, on average, population self-identified as Evangelicals have greater odds of standing against the mask mandates compared to the non-Evangelicals. The magnitude of the effect of Evangelical identities on attitudes against mask mandates reduces after we control for the support for Trump in Models (3) and (4) but the effect remains nonnegligible and statistically significant. Consistent with the previous findings, support for Trump can partially explain the effect of Evangelical identities on the attitude against mask mandates. Looking at the interaction effect between political conservativeness and years of education, Fig. 3 below presents the predicted probabilities of all five levels of attitudes on mask mandates by education and Trump support. The result consistently show that an educational gradient exists in the opposing views of Trump supporters and non-Trump supporters on mask mandates, the effect being most prominent among the "Strongly agree" and the "Strongly disagree" groups.

6. Discussion and conclusion

The world is recovering from the pandemic, but the spread of the virus has not stopped. Even with the majority of the US population having gained COVID-19 antibodies either through vaccination or infection (Crist, 2022), masking remains a low-cost, effective nonpharmaceutical intervention that is still recommended by the CDC to protect the population against the virus in the post-pandemic times (CDC, 2023). In this study, we explore factors behind the U.S. population's contention over mask mandates, and more broadly

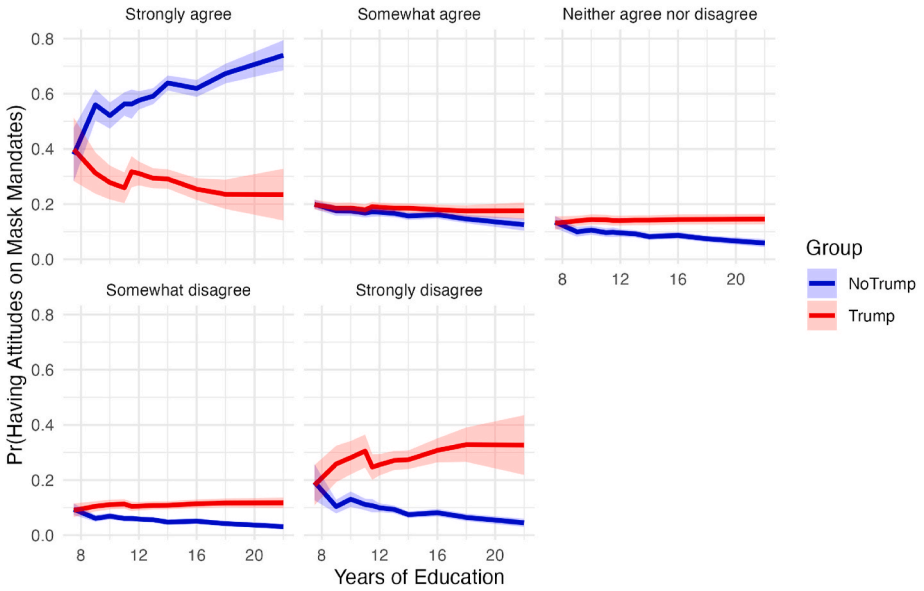

Fig. 3. Predicted probability of attitudes on mask mandates by education and Trump support.
Note: Figures are derived from models shown in Table 4, with covariates held at their observed values in the dataset before being averaged (see e.g., Mize (2019)). Data points for education levels below 7.5 years were excluded due to insufficient observations within the Trump group at these lower levels of education.
Sources: Behavioral Change COVID-19 Survey, Wave One, Wave Two, and Wave Three

the scientific paradigm they represent. Using individual-level population-representative survey data, we first hypothesize that Evangelical Americans would show resistance to wearing masks and mask mandates because they maintain a belief system distinct from science about the driver of the pandemic and its possible impacts. Our models in this study consistently support this hypothesis. We then dive further into the political stance of the Evangelical group and hypothesize that politically conservative ideology explains the pathway from an Evangelical identity to the stance against mask mandates. Results of the mediation analysis support this hypothesis and confirm that support for Trump composes a significant and substantial indirect effect that partially explains the Evangelical group's anti-mask-mandate stance. Previous studies identified an interaction effect between political polarization and education on contentious science topics (Drummond and Fischhoff, 2017; Hamilton, 2011; Hamilton et al., 2010, 2015), leading to Hypothesis 3 in this study that higher education will enlarge the bipartisan gap on masks. Our moderated mediation analysis supports this hypothesis by finding that the highly educated group experiences a significantly larger indirect effect of Evangelical identities on mask mandates resistance through support for Trump than the less educated.

Analyses in this study accord with the implications made by Gonzalez et al. (2021) that the support for Trump mediates the effect of religious conservativeness against masks. It further extends the findings of existing literature by providing the first empirical evidence of such a mechanism on an individual level, and by revealing the educational gap in this debate that is tied to divergent political identities in the contemporary U.S. Another important distinction of the current research is that it specifically looks at mask mandates, rather than the usage of masks as compared to the measurements adopted by existing research. In other words, people may wear masks but still show disapproval of the mandate itself. The mandates on masking, different from the act of mask-wearing itself, carry a stronger political implication especially to the conservatives. Theoretically, the conclusions in this study contribute to a deeper understanding of the role of ideologies and human motivations in the face of shared hardships. Practically, this study points to the perils of over-politicizing mitigation measures amid a public health crisis and calls for policies that better speak to the population with low trust in science.

Limitations of this study point to meaningful next steps of research. In terms of data, a larger sample and more granular survey questions would enable researchers to better address population heterogeneity, such as identifying possibly unique patterns within specific geographic contexts. A larger sample would also bring up the possibility of examining additional mediators, such as the role of news media in forging and strengthening partisan polarization within the country (Gonzalez et al., 2021; Perry et al., 2020). In terms of measurement, while some scholars argue that general religiosity itself is positively related to the adoption of medical recommendations during the pandemic, with Christian nationalism being an exception (Corcoran et al., 2022; Perry et al., 2021), the current research does not support this argument partly due to a lack of measurement that will allow us to discern the particular ideology of Christian nationalism from Evangelicalism, and religiosity. Using a survey that focuses on behavioral changes during COVID-19, this study also relies on limited measurements of political ideology, which leaves space for finer-grained research that, for example, could make a distinction between the impacts of political ideology and political party affiliation (Howard, 2022), and strong political leaders. More also remains to be identified about the education-political ideology interaction. For example, if the phenomenon is unique within the U.S., and if the anti-mask-mandate stance of the highly educated political conservatives appears to be congruent with their attitudes on climate change and other contentious science topics. Future research along these directions would not only give us a better understanding of public opinions and reactions to a pandemic, but will also contribute to a more comprehensive academic discussion of the ideological and cultural diversities of the U.S. population.

CRediT authorship contribution statement

Junhe Yang: Writing – original draft, Validation, Software, Methodology, Formal analysis, Conceptualization. **Zack W. Almquist:** Writing – review & editing, Supervision, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization. **James H. Jones:** Writing – review & editing, Investigation, Funding acquisition, Data curation.

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Notes

1. The variable years of education is derived as follows from the highest degree received: "No formal education" corresponds to 0; "5th or 6th grade" corresponds to 5.5; "7th or 8th grade" corresponds to 7.5; "9th grade" corresponds to 9; "10th grade" corresponds to 10; "11th grade" corresponds to 11; "12th grade No Diploma" corresponds to 11.5; "High school graduate - high school diploma or the equivalent (GED)" corresponds to 12; "Some college, no degree" corresponds to 13; "Associate degree" corresponds to 14; "Bachelor's degree" corresponds to 16; "Master's degree" corresponds to 18; "Professional or Doctorate Degree" corresponds to 22.

2. Mean and standard errors are weighted estimations derived using the *survey* package (Lumley, 2023) of the statistical software R (R Core Team, 2023).
3. The *mediation* package (Tingley et al., 2014) of the statistical software R (R Core Team, 2023) is employed for the mediation analysis formal results presented in this article, with bootstrapped *p*-value and confidence intervals.
4. The *marginaleffects* (Arel-Bundock, 2021) package of the statistical software R (R Core Team, 2023) is employed to generate predicted probabilities of the models presented in this article.

Data availability

The data underlying this article are subject to an embargo of 36 months from the publication date of the article. Once the embargo expires, the data will be available upon reasonable request to the corresponding author.

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