Political partisanship influences behavioral responses to governors' recommendations for COVID-19 prevention in the United States

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Voluntary physical distancing is essential for preventing the spread of COVID-19. We assessed the role of political partisanship in individuals' compliance with physical distancing recommendations of political leaders using data on mobility from a sample of mobile phones in 3,100 counties in the United States during March 2020, county-level partisan preferences, information about the political affiliation of state governors, and the timing of their communications about COVID-19 prevention. Regression analyses examined how political preferences influenced the association between governors' COVID-19 communications and residents' mobility patterns. Governors' recommendations for residents to stay at home preceded stay-at-home orders and led to a significant reduction in mobility that was comparable to the effect of the orders themselves. Effects were larger in Democratic-than in Republican-leaning counties, a pattern more pronounced under Republican governors. Democratic-leaning counties also responded more strongly to recommendations from Republican than from Democratic governors. Political partisanship influences citizens' decisions to voluntarily engage in physical distancing in response to communications by their governor.

COVID-19 | partisanship | elite cues | voluntary compliance

The outbreak of COVID-19 in the United States has prompted unprecedented efforts to prevent disease spread. In the absence of a vaccine, effective treatments, or widespread testing, individuals' preventive measures—from hand washing to physical distancing—are essential for reducing the speed and extent of the virus's spread (1). Some measures, such as staying home, are particularly subject to noncompliance, with possible dire consequences for attempts to "flatten the curve" of new infections.

Political leaders play an important role in persuading the public to voluntarily comply with costly preventive measures during pandemics. In addition to issuing orders that serve to reduce contact between individuals, politicians' communications about the severity with which individuals should treat a rapidly spreading disease and the preventive measures they should take are likely to be particularly influential when there is limited information about novel infectious diseases such as COVID-19. A better understanding of the link between politicians' communications and individuals' voluntarily adoption of preventive measures is thus crucial for ongoing efforts to limit the spread of COVID-19 and for improving public health more generally.

This study is motivated by three stylized facts that have emerged in the first 3 to 4 months following the COVID-19 outbreak in the United States. First, both risk perceptions (2–4) and engagement in preventive behaviors (3, 5, 6) have differed substantially by individuals' political party affiliation, with Republicans generally being slower and less likely to adopt preventive behaviors than Democrats. Second, there have been partisan differences in the COVID-19 response at the state level, with Democratic governors leading, on average, more aggres-

sive responses than Republican governors (7). Third, there has been notable within-party variation in governors' responses, with some Republican governors taking decisive steps early on (e.g., in Ohio, Massachusetts, and Maryland) and other Republican governors being ambivalent in their message or reluctant to issue stay-at-home orders. Based on these facts, this paper examines how US governors' communications influenced individuals' mobility patterns and engagement in physical distancing.

Theoretically, we build on past work that connects public opinion and actions to elites' cues (8), as well as the literature on voluntary citizen compliance with public policies more broadly (9). Here, constituents use both news outlets and social media to gauge the positions of political elites whom they trust in order to form their opinions based on these signals (10). Elite cues have been shown to steer uninformed citizens toward effective policy judgment (11, 12), but they can also cause citizens to reject scientifically valid information (13, 14). While elite cues clearly matter in "normal" times, when the stakes to individuals from following cues are relatively small, it remains an open question as to whether and how elite cues might matter during a pandemic in which individuals' actions can directly impact their own health.

On the one hand, as the United States has become increasingly polarized (15), cues from elites who share citizens' partisan

Significance

We examine the role of partisanship in engagement in physical distancing following the outbreak of the novel coronavirus COVID-19 in the United States. We use data on daily mobility patterns for US counties along with information on county-level political preferences and the timing of state government leaders' recommendations for individuals to stay at home. We find that state government leaders' recommendations were more effective in reducing mobility in Democratic-leaning counties than in Republican-leaning counties. Among Democratic-leaning counties, recommendations from Republican leaders generated larger mobility reductions than recommendations from Democratic leaders. This study highlights the nuanced role of political partisanship in influencing how leaders' COVID-19 prevention recommendations affect individuals' voluntary decisions to engage in physical distancing.

attachments could be more influential. On the other hand, research on political endorsements has shown that elite cues are especially effective when they do not conform with their own party position (16). It is thus possible, for example, that Republican governors who communicated the seriousness of COVID-19 in early March 2020, a period during which the right-leaning media and US President Donald Trump were skeptical of the risk posed by COVID-19 (17), would have a stronger effect than Democratic governors, who in raising the alarm acted in line with their party. Furthermore, it may be the case that Republican governors' communications have a greater effect on the behavior of Democratic constituents than Republicans, since "crossing the aisle" boosts credibility among members of the opposing party. Our study is designed to explore such dynamics.

Using county-level data on citizens' mobility patterns, past electoral returns that serve as proxy for county-level partisan preferences, and the timing of communications about COVID-19 by state governors in the United States, this study examines how partisanship mediates the relationship between governors' COVID-19 communications and residents' voluntary compliance with physical distancing. Specifically, we test the extent to which predominantly Democratic vs. Republican counties respond to COVID-19 prevention-related messaging by their governors, and how this relationship depends on the partisan identity of the governor. Unlike other recent studies, our focus is on the effect of governors' communications encouraging COVID-19 prevention (rather than their issuance of stay-at-home orders alone) on voluntary behavior, as these messages often preceded official stay-at-home orders, thereby influencing preorder mobility patterns. Since governors typically made their recommendations on multiple media outlets at once, we use their official Twitter accounts to determine the specific date of various COVID-19 prevention recommendations.

This paper answers three central questions about the ways in which governors' communications have affected individuals' engagement in COVID-19 prevention behaviors. Rather than focus on the effect of stay-at-home orders (2, 18), we determine the precise dates when governors began recommending voluntary physical distancing and identify the effect of those recommendations. We begin by assessing whether governors' recommendations affect county-level mobility patterns. Next, we examine whether governors' recommendations have different effects on mobility patterns in Republican- vs. Democratic-leaning counties. Finally, we assess whether the political party affiliation of governors affects mobility differently in counties with similar and opposing partisan preferences.

We find that governors' recommendations for individuals to engage in physical distancing preceded the issuance of stay-at-home orders by a meaningful period and had a significant effect on residents' mobility. These effects, which we argue are causal based on our inclusion of temporal and spatial fixed effects as well as controls for multiple confounding factors, were comparable in magnitude to the effects of stay-at-home orders themselves. Second, governors' communications generally led to larger reduction in mobility in Democratic-leaning counties. Finally, while both Democratic- and Republican-leaning counties were equally responsive to Democratic governors, Democratic-leaning counties were more responsive to Republican governors than Republican counties. This differential response under Republican governors drives the overall partisan divide in responses to governors' messaging. These results are robust to tests of several alternative explanations, to using Facebook instead of Twitter to measure governors' communications, and to more granular census block group-level analyses. They are ultimately consistent with the theory that elites' cues that are not aligned with party orthodoxy send strong signals for other-party voters but have more muted effects among own-party voters. In addition to its public health significance, our study contributes

to a better understanding of the nexus of elite cues and citizens' behavior.

Methods and Data

We used the following data to answer the study's research questions.

Mobility (Physical Distancing). The mobility of individuals in US counties during the crucial early phase of the COVID-19 outbreak in the United States is our primary outcome of interest. We use publicly released mobility statistics from *Safegraph*, derived from geolocated devices (https://www.safegraph.com/dashboard/covid19-commerce-patterns). The *Safegraph* data comprise a sample of 545 million unique device-days covering 3,140 US counties, measured continuously throughout the day and reported daily over the period of 1 March to 31 March 2020. The maximum number of unique devices captured during a given day in our sample period is 21 million. Using these data, our primary outcome is calculated at the county-day level and defined as the median time devices from a county spent at home on each day. Using the same data we also define secondary outcomes as the share of devices in each county-day pair that stayed at home for the entire day and the number of miles traveled. The time that the median device remained at home during the entire day is a better proxy for physical distancing than distance traveled, particularly in sparsely populated areas where longer travel distances may not indicate a lack of physical distancing.

Risk Perceptions. We assess risk perception using data from Google Trends on searches for the following terms: "coronavirus," "social distancing," "stay at home," and "shelter in place." These data provide a quantitative indication of the interest in each term relative to the highest point for that term in a given region and time. A higher value for each term was taken to indicate not only greater interest but also, in the case of behaviors like social distancing, a higher perceived risk of coronavirus (2). We focus on daily relative search interest for 202 metropolitan (metro) areas for the period of March 1 to 31 2020. This provides a daily time series for each individual metro area, yielding 6,262 metro-days. We use these data to show within-metro trends in search interest over time. However, these data are not appropriate for cross-sectional comparisons. For cross-sectional comparisons, we follow Stephens-Davidowitz and Pabon (19) and normalize search interest for each of the 202 metro-areas relative to the metro-day with the greatest search interest over the period of study.

Timing of Governors' COVID-19 Communications and Policy Measures. Governors in the United States differed in the speed and extent to which they recommended (or required) that citizens engage in key COVID-19 prevention measures, particularly physical distancing in the form of reducing nonessential travel outside the home. Their recommendations and orders were typically communicated to the public in multiple ways including print, radio, television, and social media. To identify the exact date when governors made recommendations for citizens to stay at home we downloaded all tweets sent from both the personal and official Twitter accounts of the governors of all 50 US states. These tweets were generally duplicated on governors' personal and official Facebook pages, and the information the tweets conveyed was repeated in press conferences that they held. We thus relied on the date and content of governors' tweets as a proxy for the date and content of their COVID-19 prevention recommendations and policies. In *SI Appendix*, section C.1 we show that there is a very high correlation between the date when stay-at-home recommendations were made on Twitter and on Facebook ($R^2 = 0.87$; *SI Appendix*, Fig. SI-3). A similar correlation is likely to be seen across other media outlets as well.

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Using social media to proxy for governors' communications, we manually coded each tweet (and Facebook post) using three binary indicators: 1) whether the tweet was relevant to COVID-19, and if so, 2) whether it encouraged social distancing, and 3) whether it encouraged staying at home ("sheltering-in-place" or "staying at home"). Stay-at-home messages necessarily entailed physical distancing, but not vice versa (See *SI Appendix*, section A for additional details). Our key independent variable was an indicator that took the value of 1 for all days after the first time a governor explicitly encouraged residents to stay at home. We also checked for robustness to using the cumulative number of messages from a governor that encouraged residents to stay at home by any given day as a proxy for the intensity with which governors recommended physical distancing (*SI Appendix*, Section D.1). Fig. 1 shows that, on average, Democratic governors began encouraging social distancing earlier than Republican governors. For example, by 21 March 2020, 16 Democratic governors, but only 4 Republican governors, had used social media to encourage state residents to stay home (Fig. 1, *Bottom*). *SI Appendix*, Fig. SI-1 shows that while the median Democratic governor began encouraging staying home 6 to 7 days before the official state order, the median Republican governor began encouraging staying home only a day before the "lockdown" policy came into effect. *SI Appendix*, Fig. SI-2 shows that not merely timing but also the intensity of Democratic governors' messaging about COVID-19 was higher than that of their Republican counterparts in the crucial month of March 2020.

Moderators. To test whether the effect of governors' communications on mobility was moderated by the partisan affiliation of governors and counties, we constructed the indicator variable "GOP governor" that takes the value of 1 if a state's governor is a Republican and 0 if a state's governor is a Democrat. In our main analysis, we measure counties' partisanship using the vote margin for President Trump (in units of 10%) in the 2016 presidential election. In some analyses, we split the sample by a county's partisan affiliation. Republican-leaning counties were defined as those in which President Trump's vote margin in 2016 was larger than 0. We obtain county- and state-level electoral data from the CQ Press Voting and Elections Collection (https://library.cqpress.com/elections/). Importantly, we test the robustness of our county-level results to disaggregating to smaller units in *SI Appendix*, section D.9 using precinct-level electoral returns taken from the Voting and Election Science Team at the University of Florida and Wichita State University (https://bit.ly/3gyCkyl).

Controls. We control for the number of daily state-level deaths due to COVID-19 and county-level cases tested positive for the virus that causes COVID-19 using data from the *New York Times* (https://github.com/nytimes/covid-19-data) and USAFacts (https://usafacts.org/issues/coronavirus/), a nonprofit civic data clearinghouse, and for official physical distancing policies at the state level from COVID19StatePolicy (https://github.com/COVID19StatePolicy/SocialDistancing). Additional county-level control variables were derived from the 5-year American Community Survey (ACS; 2014 to 2018). These included median household income, median age, population size and density, the population share over age 65 y, and the county's racial composition. All specifications also control for COVID-related messaging (on Twitter) that do not explicitly encourage staying at home. In some specifications, we further control for counties' occupation composition,* derived from the ACS, for counties' media consumption, taken from the 2018

Cooperative Congressional Election Study, and for counties' exposure to city-level local COVID-19 prevention policies, taken from the National League of Cities COVID-19 Local Action Tracker (https://covid19.nlc.org/resources/covid-19-local-action-tracker/). Since Alaska does not report electoral returns at the county level, we omitted counties from this state. Our final sample consists of 94,690 county-day observations from 3,100 counties across 49 states.

Estimation Strategy. We use difference-in-differences regressions to estimate the effect of governors' stay-at-home recommendation on mobility. Our main estimation strategy uses an event-study design in which a county is considered treated for all days after the first instance in which a governor encouraged state residents to stay at home to prevent the spread of COVID-19. Once we flexibly control for differential trends in outcomes based on counties' fixed characteristics, date and county fixed effects, the daily number of deaths and confirmed COVID-19 cases, the intensity of governors' communications, and the type of state-wide orders issued at any given day, our identification assumption is that given parallel trends, changes in the number of minutes at home from before to after a governor's stay-at-home communications, relative to control counties, has a causal interpretation. See *SI Appendix*, section B for additional details.

Results

Table 1 reports the summary statistics of all variables used in the empirical analysis. We present the study's main results in Table 2. We find that governors' recommendations for residents to stay at home had a positive and significant effect on time spent at home, above and beyond the effect of state orders requiring nonessential workers to stay home. These estimates were based on models that included county and day fixed effects as well as a large number of controls as noted above. Averaging across all US counties (Table 2, Panel A, column 1), a governor's recommendation that residents stay at home increased median time spent at home by 10.4 min per day (or a 3.4% increase) compared with the immediate period before the recommendation was issued. This effect size represents 1.7% of the prerecommendation mean for all hours in the day, but 8% of waking hours.† The finding is robust to using minutes at home in levels or in logs, to using alternative mobility measures (*SI Appendix*, Table SI-6), to using cumulative number of Twitter messages rather than the first Twitter recommendation (*SI Appendix*, Table SI-2), to dropping outliers and counties with low device coverage (*SI Appendix*, Table SI-12), and to looking at messages encouraging residents to physically distance only (*SI Appendix*, Table SI-8).

The effect of governors' initial recommendations for residents to stay at home on those residents' mobility patterns was comparable to the effect of actual stay-at-home orders (i.e., mandates) that those same governors subsequently issued (Table 3). In the full sample, the effect of messaging was about 23.5% larger than the effect of stay-at-home orders, although the difference between the two effects was not statistically significant. The effects of the initial recommendations were 4.8 times larger than the effects of stay-at-home orders in Democratic-leaning counties. However, in Republican-leaning counties, the effects of orders and recommendations are nearly identical in magnitude. As expected, the effects of stay-home messaging were generally larger in the period before the official orders were issued (*SI Appendix*, Table SI-2).

We also find evidence that the effect of governors' messages encouraging residents to stay at home was more effective in

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*We controlled separately for the share of the working-age population employed in services, manufacturing, and retail.

†We define time at home in waking hours as time at home minus 8*60.

Fig. 1. Governors' tweets by topic. Figure shows the cumulative number of governors tweeting about coronavirus (*Top*), social distancing (*Middle*), and staying home (*Bottom*) by date and governor partisan affiliation. The governors of Alaska (Republican [R]), Florida (R), Georgia (R), Iowa (R), South Carolina (R), and South Dakota (R) did not tweet about staying home (shelter-in-place) during this time period.

Democratic-leaning counties than Republican-leaning counties (Table 2, Panel A, column 2). Our estimates indicate that a 10 percentage-point increase in President Trump's vote margin reduced the effect of governors' communications on mobility by about 1.7 min, or 10.7% of the effect size in a county where Clinton and Trump were tied in 2016. Nonetheless, the overall effect of governors' communications on mobility remained large and significant in both Democratic- and Republican-leaning counties (*SI Appendix,* Fig. SI-10, *Left* and Table 2, Panel B).

Table 2, Panel B shows that the effect of governors' first stay-at-home recommendations on mobility was more than two times larger in counties that voted for Hillary Clinton (21.2 min, or 4.1% change) than in counties that voted for President Trump (10 min, or 3.1%). These estimates represent 19.9% and 7.4% percent of the mean time at home during waking hours prior to the event, respectively. This finding was further reinforced by the event-study plot of the estimated daily mobility change before and after the first recommendation encouraging

Table 1. Summary statistics

Variable	Democratic counties	Republican counties	All counties
Outcomes			
Median time at home, min	638.41	641.14	640.72
	(229.07)	(185.42)	(192.86)
Log median time at home	6.34	6.38	6.37
	(0.64)	(0.54)	(0.56)
Share of devices home all day	28.40	25.52	25.97
	(9.21)	(7.91)	(8.19)
Log distance traveled	8.87	9.04	9.01
	(0.54)	(0.61)	(0.60)
Independent variables			
COVID-19 messages	5.16	5.17	5.17
	(6.95)	(7.81)	(7.68)
Social distancing messages	1.17	1.14	1.15
	(2.29)	(2.51)	(2.48)
Stay home messages	0.44	0.38	0.39
	(1.38)	(1.42)	(1.41)
Post social distancing message	0.63	0.61	0.61
	(0.48)	(0.49)	(0.49)
Post stay-at-home message	0.28	0.26	0.26
	(0.45)	(0.44)	(0.44)
Trump vote margin	—0.23	0.42	0.32
	(0.18)	(0.20)	(0.30)
Covariates			
Post emergency order	0.70	0.68	0.68
	(0.46)	(0.47)	(0.47)
Post large gatherings ban	0.48	0.41	0.42
	(0.50)	(0.49)	(0.49)
Post school closure	0.48	0.44	0.45
	(0.50)	(0.50)	(0.50)
Post restaurant closure	0.44	0.40	0.41
	(0.50)	(0.49)	(0.49)
Post nonessential business closure	0.17	0.13	0.14
	(0.38)	(0.34)	(0.34)
Post stay-at-home order	0.19	0.16	0.16
	(0.40)	(0.36)	(0.37)
Confirmed COVID-19 cases	56.88	2.66	11.08
	(439.51)	(51.26)	(180.58)
Median age	38.41	41.83	41.30
	(5.23)	(5.11)	(5.28)
Log household income	10.86	10.81	10.82
	(0.37)	(0.22)	(0.25)
Share over 65 y	0.16	0.19	0.18
	(0.04)	(0.04)	(0.04)
Share Black	0.22	0.07	0.09
	(0.24)	(0.10)	(0.15)
Share Hispanic	0.15	0.08	0.09
	(0.21)	(0.11)	(0.14)
Share male	0.49	0.50	0.50
	(0.02)	(0.02)	(0.02)
Population density	457.46	39.02	104.01
	(1,719.47)	(97.60)	(700.16)
Share retail	0.11	0.11	0.11
	(0.02)	(0.02)	(0.02)
Share service	0.20	0.18	0.18
	(0.04)	(0.03)	(0.04)
Share manufacturing	0.10	0.13	0.12
	(0.06)	(0.07)	(0.07)
Observations	14,708	79,982	94,690
Counties	484	2,616	3,100

Table displays means and standard deviations of key variables of interest, as well as the number of observations and the number of clusters. The sample consisted of 94,690 county-days from 1 March to 31 March 2020.

Table 2. Governors' tweets, partisanship, and mobility

Panel A: Full sample				
Outcome	Median minutes at home		Log minutes at home	
Post stay-at-home message	10.409***	15.694***	0.034***	0.031**
	(3.542)	(4.697)	(0.009)	(0.014)
Post stay-at-home message × Trump vote margin		−1.679**		0.001
		(0.707)		(0.002)
Observations R^2	94,690	94,690	94,690	94,690
	0.984	0.984	0.997	0.997
County fixed effect (FE)	Yes	Yes	Yes	Yes
Day FE	Yes	Yes	Yes	Yes
Demographics × Day FE	Yes	Yes	Yes	Yes
Trump margin × Day FE	Yes	Yes	Yes	Yes
COVID controls	Yes	Yes	Yes	Yes
Other tweets	Yes	Yes	Yes	Yes
Orders	Yes	Yes	Yes	Yes

Panel B: By county party				
Outcome	Median time at home		Log time at home	
County party	Dem	Rep	Dem	Rep
Post stay-at-home message	21.217***	9.956***	0.041*	0.031***
	(7.634)	(3.243)	(0.020)	(0.009)
Observations R^2	14,708	79,982	14,708	79,982
	0.985	0.984	0.997	0.998
County FE	Yes	Yes	Yes	Yes
Day FE	Yes	Yes	Yes	Yes
Demographics × Day FE	Yes	Yes	Yes	Yes
Trump margin × Day FE	Yes	Yes	Yes	Yes
COVID controls	Yes	Yes	Yes	Yes
Other tweets	Yes	Yes	Yes	Yes
Orders	Yes	Yes	Yes	Yes

Panel C: Triple interactions				
Outcome	Median time at home	Log time at home		
Interaction	Continuous vote margin	Binary	Continuous vote margin	Binary
Post stay-at-home message	12.728**	9.978	0.009	−0.011
	(6.094)	(6.395)	(0.013)	(0.023)
Post stay-at-home message × Republican governor	6.464	23.380**	0.055**	0.115***
	(8.096)	(11.329)	(0.021)	(0.030)
Post stay-at-home message × Trump vote margin	0.964		0.008***	
	(1.033)		(0.003)	
Post stay-at-home message × Republican governor × Trump vote margin	−4.460***		−0.014***	
	(1.271)		(0.004)	
Post stay-at-home message × Republican county		7.000		0.051**
		(4.540)		(0.022)
Post stay-at-home message × Republican governor × Republican county		−42.820***		−0.138***
		(10.124)		(0.031)
Republican county × Day FE	No	Yes	No	Yes
Trump margin × Day FE	Yes	No	Yes	No
Republican governor × Day FE	Yes	Yes	Yes	Yes
Republican county × Republican governor × Day FE	No	Yes	No	Yes
Trump margin × Republican governor × Day FE	Yes	No	Yes	No
COVID controls	Yes	Yes	Yes	Yes
Other tweets	Yes	Yes	Yes	Yes
Orders	Yes	Yes	Yes	Yes
Observations R^2	94,690	94,690	94,690	94,690
	0.984	0.984	0.997	0.997

Standard errors in parentheses clustered at the state level. Sample is 96,690 county-days over the period 1 March to 31 March 2020. Treatment indicator equals 1 for all days after the governor of state s issues a tweet encouraging citizens to stay home. "Trump vote margin" is county i's vote margin for President Trump in the 2016 election. Republican counties are those in which Trump's vote margin in 2016 was greater than zero. County-level demographic controls are median age, log household income, population density, share of population over 65 y, share Black, share Hispanic, and share male. "COVID controls" include controls for county-level COVID cases and state-level COVID deaths. "Other tweets" includes controls for post-COVID and social distancing related tweets. "Orders" includes controls for whether the state has issued the following types of orders: emergency declarations, banning large gatherings, school closures, restaurant/bar closures, nonessential business closures, and stay-at-home orders. ***$P < 0.01$, **$P < 0.05$, *$P < 0.1$.

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Table 3. Governors' tweets and stay-at-home orders

Outcome	Median time at home			Log time at home		
	All	Dem	Rep	All	Dem	Rep
County party	(1)	(2)	(3)	(4)	(5)	(6)
Post stay home message	10.409***	21.217***	9.956***	0.034***	0.041*	0.031***
	(3.542)	(7.634)	(3.243)	(0.009)	(0.020)	(0.009)
Post stay home order	8.425*	4.554	9.503**	−0.001	−0.017	0.004
	(4.380)	(9.457)	(4.239)	(0.014)	(0.023)	(0.014)
$\beta_1 - \beta_2$	1.984	16.663	0.453	0.036	0.057	0.026
	(5.558)	(14.167)	(5.095)	(0.016)	(0.031)	(0.015)
Observations R^2	94690	14708	79982	94690	14708	79982
	0.984	0.985	0.984	0.997	0.997	0.998
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Day FE	Yes	Yes	Yes	Yes	Yes	Yes
Demographics × Day FE	Yes	Yes	Yes	Yes	Yes	Yes
Trump margin × Day FE	Yes	Yes	Yes	Yes	Yes	Yes
COVID controls	Yes	Yes	Yes	Yes	Yes	Yes
Other tweets	Yes	Yes	Yes	Yes	Yes	Yes

Sample is 94,690 county-days between 1 March and 31 March 2020. Treatment indicator equals 1 for all days after the governor of state *s* issues a tweet about staying home. "Trump vote margin" is county *i*'s vote margin for Donald Trump in the 2016 presidential election. Republican counties are those in which Trump's vote margin in 2016 was greater than zero. County-level demographic controls are median age, log household income, population density, share of population over 65 y, share Black, share Hispanic, and share male. "COVID controls" account for county-level confirmed positive cases and state-level COVID-19 deaths. "Other tweets" includes controls for post-COVID and social distancing related tweets. Standard errors clustered at the state level. $\beta_1 - \beta_2$ is the difference between messaging and stay at home order coefficients. ***$P < 0.01$, **$P < 0.05$, *$P < 0.1$.

residents to stay at home (Fig. 2).[‡] While there was a discernible effect on mobility within 2 to 3 days of the first stay-at-home message from a governor for both right- and left-leaning counties, the effect was substantially more pronounced in Democratic-leaning counties (Fig. 2, *Left*). The event-study results support the assumption of parallel trends, as there was no significant divergence in mobility trends between treated and control counties prior to governors' issuance of a stay-home communication, bolstering our confidence that the estimates capture a causal effect of elite messaging on mobility.

Political conservatism may be correlated with omitted variables that influence individuals' responsiveness to messaging. Republican-leaning counties may be poorer, less population-dense, or have different occupational composition, which may in turn affect the extent to which citizens can adjust their mobility behavior in response to governors' recommendations. Since the inclusion of county fixed effects and interactions between county-level characteristics and time alone may not adjust for such effects, in SI Appendix, Table SI-4 we augmented the main specification to include interactions between exposure to stay-home messaging and log household income, population density, and the county-level share of the working population employed in manufacturing, retail, and services. None of these interactions materially affected the magnitude or significance of the results. In SI Appendix, Table SI-5, we further showed that our main results are robust to controlling for the interaction between stay-home messaging exposure and counties' news consumption patterns.

In models that tested whether county residents' partisan preference and governors' party affiliation moderated the effect of governors' stay-at-home recommendations on mobility patterns (Table 2, Panel C), we found that Republican governors in particular had differing effects on mobility in Democratic- vs. Republican-leaning areas. To ease the interpretation of the triple-interaction models in Table 2, Panel C, we divided the sample by governors' party affiliation and estimated the effect of

governors' stay-at-home recommendation on mobility by levels of President Trump's vote margin (*SI Appendix, Table SI-3*).

In states with a Democratic governor, we find no evidence of a difference between the responses of Democratic and Republican voters: the interaction of the stay-at-home recommendation and President Trump's vote margin is insignificant (*SI Appendix, Table SI-3*, Panel A, column 2). However, in states with a Republican governor, Democratic-leaning counties responded more strongly than Republican-leaning counties. Here, a higher vote margin for President Trump was significantly associated with a smaller effect of governors' recommendations on mobility (*SI Appendix, Table SI-3*, Panel B, column 2).

These dynamics are further explored in Fig. 3, which plots the marginal effect of a governor's first stay-at-home recommendation on mobility by levels of 2016 Trump support (20).[§] Fig. 3*A* shows that the response to tweets from Republican governors encouraging residents to stay at home was strongly decreasing with President Trump's vote margin, while under Democratic governors (Fig. 3*B*) it was weakly (but not significantly) increasing. The most responsive counties are Democratic-leaning areas in Republican states, while the least responsive are deeply conservative areas in Republican states.[¶] Since the latter comprise most of the data in Republican states, this leads to a smaller effect size in Republican states of 5.6 min increase postmessage when averaging across the political spectrum (*SI Appendix, Table SI-3*, Panel B, column 1). In contrast, both Democratic- and Republican-leaning counties in Democratic states respond similarly to their governor's messaging, yielding a somewhat larger average effect of 12.8 min (*SI Appendix, Table SI-3*, Panel A, column 1).

[‡] For details of the event-study estimation, see *SI Appendix, section B*.

[§] This figure corresponds to the estimates reported in *SI Appendix, Table SI-3*.

[¶] In the median Democratic county of a Republican state (Trump −22%), Democrats responded to a stay-at-home recommendation by their governor by increasing time at home by 28.6 min. By contrast, in those states, governors' recommendations were associated with 3.7-min increase in time spent at home in the median Republican county (here, President Trump's vote margin is +45%).
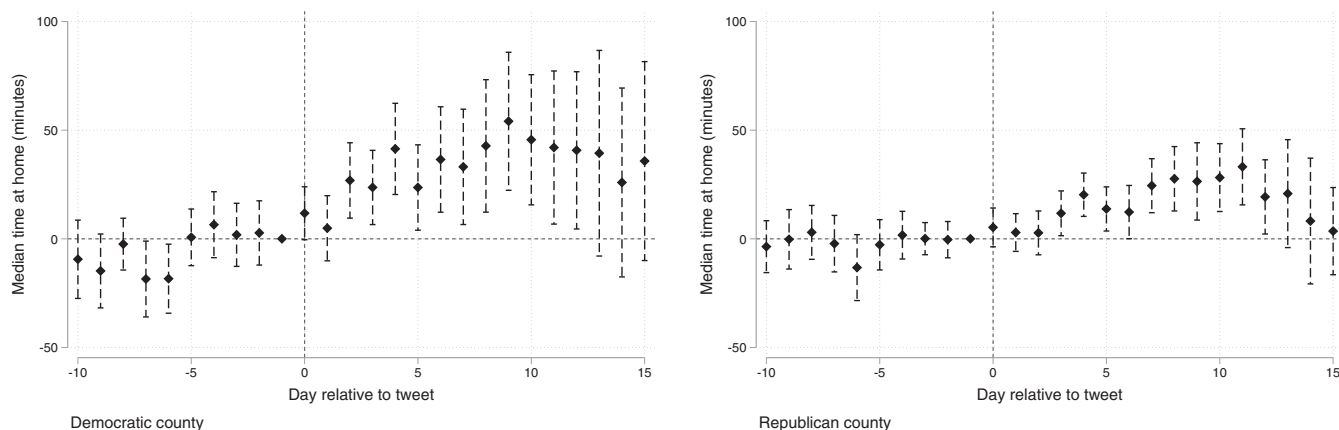
Fig. 2. Event study: governors' "stay home" tweets by counties' partisanship. Figure shows coefficients from a county-level event-study regression of median time at home on indicators for leads and lags of the treatment (an indicator equaling 1 for all days after a governor issues his or her first tweet encouraging citizens to stay at home). Models include county and date fixed effects. The sample is split by Democratic counties (*Left*) and Republican counties (*Right*).

Finally, with the exception of deeply conservative areas whose response diverges under different governors, Republican-leaning counties in general respond similarly to messaging from Republican and Democratic governors. For example, in states with a Democratic governor, the median county with respect to President Trump vote margin is Trump +29.5%. Using the coefficients of *SI Appendix,* Table SI-3, Panel A, column 2 the first stay-at-home recommendation increased time at home by 13.29 min.[#] Similarly, in states led by a Republican governor, the effects of the governor's tweet in a Trump +29.5% county was estimated to be 9.49 min.[‖]

As shown in *SI Appendix*, our key findings are robust to replicating our analyses using a smaller geographic level such as census block groups (*SI Appendix,* Table SI-14), which have greater homogeneity in partisan preferences, as well analyses that rely on US governors' Facebook accounts to determining the timing of their recommendations for citizens to stay home (*SI Appendix,* Table SI-16). The results are also robust to alternative definitions of the main exposure variable (*SI Appendix,* Tables SI-2, SI-7, and SI-8) and outcome variable (*SI Appendix,* Table SI-6), to accounting for county-level occupational structure (*SI Appendix,* Table SI-4) and media exposure (*SI Appendix,* Table SI-5), and importantly, to controlling for local municipal stay-at-home orders in urban regions (*SI Appendix,* Table SI-13).

Discussion

Governments play a central role in combating pandemics by financing the development and testing of vaccines and treatments, scaling-up testing and contact tracing, and coordinating the response of various agencies and institutions. Yet the success of these efforts also depends crucially on the actions taken by individuals who are asked to voluntarily comply with costly measures to prevent transmission. This study shows the importance of state governors' communications, but also that political partisanship influenced individuals' responses to governors' messaging about the need to engage in physical distancing and stay at home during the outbreak of the novel coronavirus in the United States. We report three main findings that are strikingly robust to controlling for various confounding factors.

First, Democratic and Republican governors' recommendations for citizens to stay at home and limit nonessential travel, which preceded the issuance of stay-at-home orders, were associated with a significant reduction in mobility in both Democratic-leaning and Republican-leaning counties.[**] This finding is consistent with the idea that political leaders can strongly influence the behavior of their constituents and achieve higher compliance with prevention measures during a public health crisis (21). Importantly, governors' communications affected the behavior of citizens with congruent preferences (i.e., same party as the governor), but also of citizens with incongruent partisan preferences. One reason governors' messaging can be consequential is by explaining why individuals are asked to take costly actions. Google Trends searches, which are an indicator of interest in an issue (2, 19), show that governors' communications increased the frequency of search terms related to social distancing and staying home and these increases occurred days before stay-at-home orders were issued (*SI Appendix,* Table SI-1).

Second, Republican-leaning counties responded less strongly than Democratic-leaning counties to governors' communications encouraging residents to stay at home. This robust finding—that persists even after controlling for county and time fixed effects, local (in addition to state) orders, and county-level socioeconomic and demographic characteristics—is consistent with a growing literature that finds both differential levels of social distancing by partisan affiliation (4) as well as differential responses to stay-at-home orders (2, 3, 6, 18).

Third, and most notably, Democratic-leaning counties were especially responsive to messages from Republican governors: The differential partisan response is driven entirely by Democratic-leaning counties in Republican-governed states. The reduction in mobility induced by a Republic governor was estimated to be about 24 min in counties where President Trump lost by 10% in the 2016 general election (*SI Appendix,* Table SI-3, Panel B). In contrast, the effect of Democratic governors on mobility in similarly Democratic-leaning counties was 2.6 times lower, with only a 9-min reduction in mobility (*SI Appendix,* Table SI-3, Panel A). This finding is consistent with the literature on political endorsements, and signaling more generally. Republican governors who broke with the national party and sounded the alarm on COVID-19 sent a strong and consequential
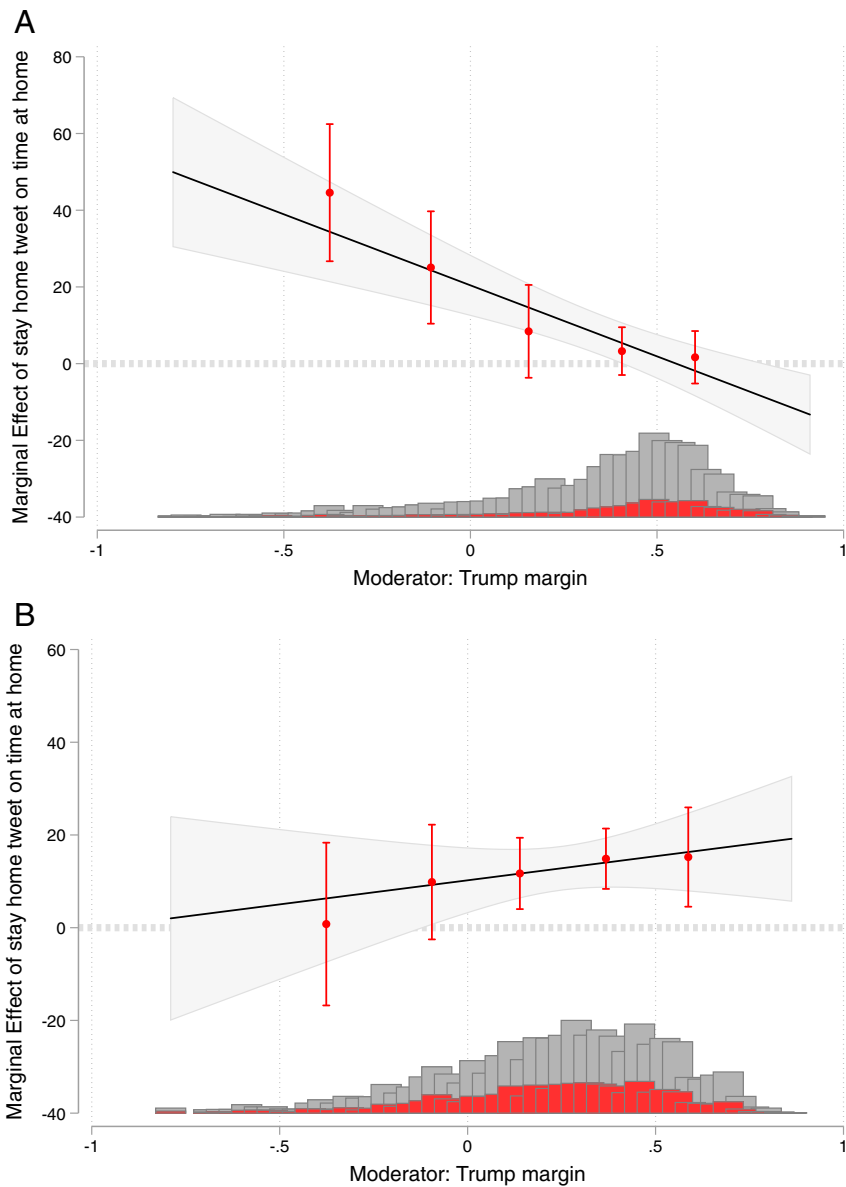
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Fig. 3. Predictive margins: effect of "stay home" tweet by Trump vote share and governor party. Figure shows predicted values and 95% confidence intervals from a county-level regression of median time at home on the treatment indicator, its interaction with Donald Trump's county-level vote share in the 2016 presidential election, county and day fixed effects, as well as day fixed effects interacted with control variables and Trump's 2016 margin (see *SI Appendix*, Table SI-3, Panels A and B). The treatment is an indicator variable equaling 1 for all days after a governor issues their first recommendation encouraging citizens to stay at home. We estimate the model separately for states with Democratic (*A*) and Republican (*B*) governors. The fitted line shows the linear marginal effect of the treatment at different levels of Trump vote share for each state type. The points with 95% confidence intervals show semiparametric estimates of the marginal effect of the treatment at five different bins of Trump vote share. Bins are (−1, −0.25), (0.25, 0), (0, 0.25), and (0.25, 0.5). The histogram below the predicted margins displays the density of the county-level Trump vote margin by treatment status (red is treated, gray is untreated). Figure uses the INTERFLEX package (20).

signal to their Democratic constituents, since those governors' messages were in contrast to the general views held by Republican leaders about COVID-19. In short, elite communications were stronger when they did not conform with the party affiliation of those elites. Democratic governors were largely expected to encourage social distancing, blunting the force of the signal and therefore the partisan effects of their COVID-19 communications.

Indeed, the fact the GOP leaders were sending mixed messages about COVID-19 helps explain why the effect of Republican governors' messaging on mobility was stronger in Democratic counties and moderate Republic counties than

conservative strongholds. This result is consistent with a "backlash" effect, whereby conservative Republican areas react to signals from their local Republican leaders that contradict national-level party messaging with either indifference or outright hostility. Under Democratic governors, this backlash effect is absent as Democratic governors' calls for adopting preventive measures did not conflict with national-level party messaging.

This study has several limitations. Messages from governors encouraging social distancing and staying at home were obtained from their Twitter accounts, which are not their sole mode of communication to constituents. However, as we show in *SI Appendix*, these messages were likely to be closely

accompanied by other forms of communication to constituents. Another limitation is that governors' communications encouraging residents to stay at home may have been correlated with the voluntary closure of workplaces, which may have been the reason why individuals tended to spend more time at home. While this might affect the magnitude of the association between messages and mobility, in our analyses we control for the issuance of various (local and state-level) orders for schools and other institutions to close. Moreover this should not have as strong as an effect on the associations found with political preferences of county residents.

This study demonstrates how and why political partisanship has influenced citizens' decisions to voluntarily engage in social distancing and reduce their mobility in response to communica-

tions by their state governor during the COVID-19 outbreak in the United States. The results support several theories of how elite cues influence public opinion and costly voluntary actions, and provide valuable insights on how governors' communications can influence behavior in the ongoing response to COVID-19.

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