Attention to the COVID-19 pandemic on Twitter: Partisan differences among U.S. state legislators

September 7, 2021

Abstract

Subnational governments in the United States have taken the lead on many aspects of the response to the COVID-19 pandemic. Variation in government activity across states offers the opportunity to analyze responses in comparable settings. We study a common and informative activity among state officials—state legislators' attention to the pandemic on Twitter. We find that legislators' attention to the pandemic strongly correlates with the number of cases in the legislator's state, the national count of new deaths, and the number of pandemic-related public policies passed within the legislator's state. Furthermore, we find that the degree of responsiveness to pandemic indicators differs significantly across political parties, with Republicans exhibiting weaker responses, on average. Lastly, we find significant differences in the content of tweets about the pandemic by Democratic and Republican legislators, with Democrats focused on health indicators and impacts, and Republicans focused on business impacts and opening the economy.

Keywords: *COVID-19, Twitter, Legislators, U.S. states, Partisanship*

Introduction

State governments in the United States have played, and continue to play, substantial roles in shaping the management of the COVID-19 pandemic (Adolph et al., 2021). Initial state policy considerations concerned the scope and timing of lockdowns (Ng, 2020), restrictions on intra- and interstate travel (Studdert, Hall and Mello, 2020), and ongoing pandemic management regulations regarding policies such as masking and indoor gathering capacity (Fraser, Juliano and Nichols, 2021). More recently, states have developed policies to disseminate COVID-19 vaccines (Grünebaum et al., 2021). Much of the existing research on states' responses to the pandemic has focused on aggregate, state-level activity. We contribute a micro-level perspective, analyzing how individual policymakers (state legislators) respond to pandemic dynamics in their public rhetoric.

Analyzing variation in pandemic management activity across states and individual policymakers is useful for effectively drawing insights from past experiences and projecting the trajectory of state responses going forward. Though it is feasible to conduct cross-state comparisons of governors' management of the pandemic in terms of policy enactments (Baccini and Brodeur, 2020); due to cross-state differences in resources, powers, and

organization (see, e.g., Gerber, Maestas and Dometrius, 2005; Barber, Bolton and Thrower, 2019), it is more challenging to compare reactions to the pandemic in the legislative branch of state governments. We build and analyze a database of over 5,000 U.S. state legislators on Twitter—a platform through which we can track timely and comparable measures of attention to the pandemic among state lawmakers. We analyze the degree to which lawmakers' attention to the pandemic correlates with pandemic indicators at the national and state levels, and study how these relationships differ based on the legislators' partisanship.

Though public policy is not made directly on social media, public officials' social media activity serves several significant functions in the policy and political processes. Public officials' activities on social media have been found to influence public policy diffusion (Schuster, Jörgens and Kolleck, 2021), the effectiveness of policy implementation (Kavanaugh et al., 2012; Graham, Avery and Park, 2015), political engagement among young citizens (Marquart, Ohme and Möller, 2020), and media coverage (Broersma and Graham, 2012; Von Nordheim, Boczek and Koppers, 2018). Indeed, several of the tweets in the data that we report on below appear in recent news articles (e.g., Coleman, 2020; Sobey, 2020). Overall, social media use serves as a direct and cost-effective mechanism through which politicians at all levels of government can engage the public's interest agenda (Conway, Kenski and Wang, 2015; Barberá et al., 2019). The state legislators who we study have a substantial following on social media—approximately 3.7 million unique followers, which is, e.g., more than the number of followers of U.S. Senator (and Majority Leader) Chuck Schumer (D-NY) as of March 23, 2021.

Given the relatively novel nature of data on state legislators' social media use, we seek to understand the broad factors that drive state legislators' activity on Twitter, within the focused and salient context of COVID-19 discourse. We focus on two categories of factors. First, we know from the literature that public officials regularly use Twitter to discuss and respond to contemporary policy problems (Jörgens, Kolleck and Saerbeck, 2016; Russell, 2021). We therefore expect legislators' discussion of the pandemic to be directly related to the severity of the pandemic in their states, and the degree to which their state governments are involved in policymaking related to the pandemic.

Second, in past research on U.S. elected officials' social media use, partisanship has been found to be the primary factor in explaining the nature of officials' social media

engagement. For example, U.S. Senators engage in highly partisan rhetoric on Twitter (Russell, 2018). Partisanship was one of the primary determinants of how U.S. Congress members' framed the confirmation hearings of Supreme Court nominee Brett Kavanaugh in their tweets (Wright, Clark and Evans, 2021). In the 115th Congress, the average legislator devoted 22% of their tweets to partisan rhetoric (Gelman and Wilson, 2021). Given the highly politicized nature of the pandemic (Pickup, Stecula and Van Der Linden, 2020; Green et al., 2020), and the partisan dynamics of U.S. national politics (Burke, 2021; Zingher and Richman, 2019), we hypothesize that partisanship moderates the frequency and content of legislators' online engagement with the pandemic. Our contributions are threefold. First, we offer one of the only analyses of state legislators' online communications—covering what we believe to be every U.S. state legislator on Twitter. Second, we contribute to our understanding of how partisanship shapes legislative rhetoric at the state level. Third, we contribute a large-scale analysis of the factors that drive individual state legislators to engage publicly on issues related to the COVID-19 pandemic.

Data Collection

In order to investigate state legislators' attention to the pandemic and their responses, we (1) hand-collected relevant Twitter accounts, (2) identified tweets about the pandemic, (3) gathered data on pandemic indicators as well as state legislators, and (4) gathered data on COVID-19 related policies in the states.

State Legislators' Twitter Accounts

To identify the Twitter accounts belonging to state legislators, we relied on existing data (Cook, 2017), searches on Google, Twitter, and Wikipedia, state legislators' official legislative and campaign websites, and Ballotpedia. Out of the population of 7,383 state legislators in the U.S., there are 5,376 for which we identified at least one account. This amounts to 72.8% of the population of state legislators, an increase from 65.1% recorded in September 2015 (Cook, 2017). For the analysis in the subsequent sections, we focus on 4,092 accounts that posted at least one tweet during the period from Mar 30 and Oct 25 2020. We have two reasons for limiting our focus to this timeline. First, the week of March

30 (March 30–April 5) is approximately when the pandemic started to spread nationwide in that both the number of states without new cases and the number of states without new deaths converged to zero (see Figure S7 in the Supplementary Information (SI)). Second, we chose to end the timeline we analyze right before the 2020 U.S. Election because state legislators' use of Twitter substantially destabilizes in the period following the election. Compared to the population of U.S. state legislators, the sample of 4,092 accounts slightly over-represent women and Democrats (for detailed information, see the SI). Since the population of legislators with active Twitter accounts differs slightly from the overall population of state legislators, we note that our findings can only be generalized to state legislators on Twitter.

Tweets about the Pandemic

To gather tweets about the pandemic, we first retrieved all the tweets published on the timeline of each of the identified accounts (as of Oct 25, 2020, the number of retrieved tweets was over six million). A total of 1,326,220 tweets was posted between Mar 30 and Oct 25, 2020. We took a machine learning approach to identifying tweets that are relevant to the COVID-19 pandemic. For detailed information about our coding and machine learning classification, see the SI. We found a total of 270,103 tweets about the pandemic, which is 20.4% of all tweets posted during the period of study.

Public Policy Data for the Pandemic

We captured state public policy activity with daily counts of policy actions drawn from the COVID-19 US State Policy Database (CUSP) compiled by researchers at Boston University (Raifman et al., 2020). CUSP tracks orders, mandates, and official governor press releases, including only policies that apply to the whole state. We included all policy entries from CUSP that had action dates within our study period. This produced a list of 79 distinct policies with 1,894 state actions during the study period.

Partisan Differences in COVID-19 Pandemic Attention

Our core theoretical question regards how state legislators' communications about the pandemic have differed based on partisanship. In our empirical analysis we consider two dimensions of legislators' pandemic-related communication—content and frequency. The analysis of content provides insight into the topics emphasized in legislators' discussion of the pandemic, and the analysis of frequency provides insight into the factors that drive the timing and overall intensity of legislators' discussion of the pandemic.

The Content of Pandemic Discussion

To analyze the partisan differences in pandemic discussion content, we focus on identifying the terms that effectively differentiate Democrats' and Republicans' pandemic-relevant tweets. In Figure 1 we use the "fightin' words" (FW) measure and visualization (Monroe, Colaresi and Quinn, 2008) to illustrate the textual features that best differentiate Democratic and Republican tweets about the pandemic. The x-axis in this plot depicts the relative frequency with which the term occurs in the respective group. The y-axis depicts the strength with which the term correlates with group membership. Terms located higher on the y-axis signal a stronger association with the tweet belonging to the respective group. Each plot includes (up to) the 100 top words that discriminate between the two groups. The FW measure produces a z-score that quantifies the significance with which the use of a term differs between the two groups of documents. We only plot terms for which the z-score exceeds 1.96 in magnitude.

We see clear differences in the ways Democratic and Republican legislators discuss the pandemic. Republicans emphasize the business and state political environments, with a focus on re-opening. Democrats emphasize the health indicators and policies aimed at slowing the spread of COVID-19. These differences in content across parties are largely in line with previous work on the differences in COVID-19 relevant tweet content between Democratic and Republican members of the U.S. Congress (Green et al., 2020). Note that in the top-left of the plot, we see that one of the 'terms' that disproportionately appears in Democrat tweets is a bullet point. This indicates that Democrats are more likely than Republicans to make lists when discussing the pandemic.

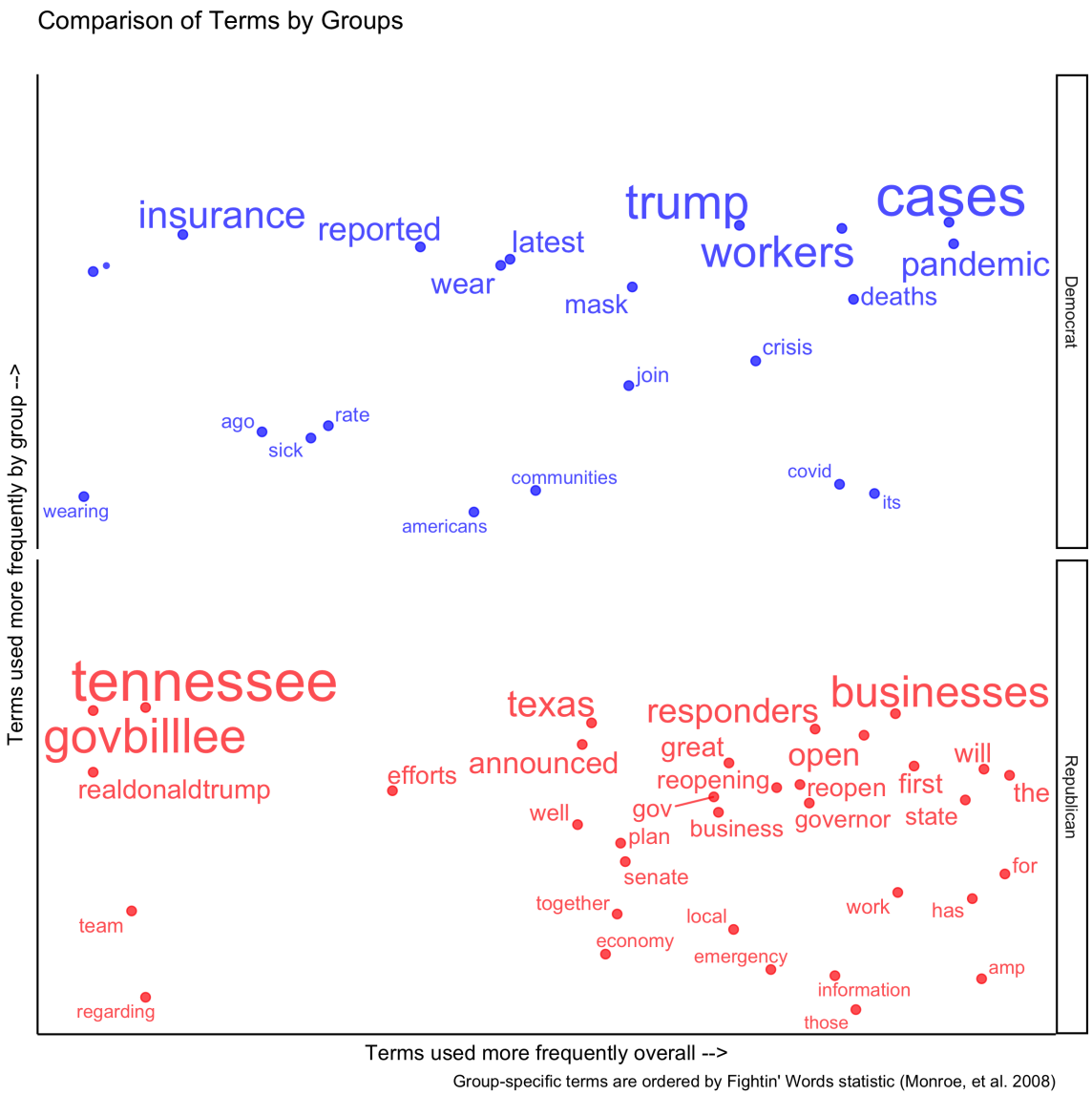

Figure 1: Words that differentiate between the content of tweets by Republican and Democrat legislators, identified using fightin' words (Monroe, Colaresi and Quinn, 2008).

The Frequency of Pandemic Attention

We now study how state legislators' attention to the pandemic on Twitter responds to public health indicators and reflects pandemic-related public policy activities. Specifically, we regressed the weekly count of legislators' pandemic-related tweets (measured on the natural log scale to limit the influence of outliers (Xiao et al., 2011)) on a number of independent variables. To study the effects of public health indicators, we included weekly state- and national-level new cases and deaths. Though we expect partisan patterns to follow the national-level party divide, it appears that the content of discussion is more state-focused. As a simple proxy, we looked at the relative prevalence of mentions of former President Trump's Twitter handle to the mention of any active state governor's Twitter handle—see the SI for details. On average, governors' handles (in 7.4% of tweets) are mentioned more than ten times as frequently as are Trump's handle (in 0.9% of tweets). COVID-19 national and state health indicators come from Johns Hopkins University (Dong, Du and Gardner, 2020).

To understand the relationship between online discourse and policymaking activity, we included the count of weekly pandemic-related public policies adopted in legislators' states from CUSP. We expect that legislators will engage more heavily with pandemic-relevant discussion on Twitter in the time leading up to and immediately following pandemic policy adoptions in their states.

We normalized all the pandemic indicator variables to indicate the count per 10,000 residents. To understand how the effects are conditioned on legislators' political parties, we interact, via multiplicative terms (Brambor, Clark and Golder, 2006), the pandemic health indicator variables and the policymaking variable with indicator variables for the party of the legislator (Republican, Democrat, and other). We excluded the observations from Nebraska because its state legislature is nonpartisan.

The data are cross-sectional time series, with legislators within states tweeting over time. We model possible dependencies via fixed effects for states, two-way random effects for legislators and weeks, and autocorrelation-robust standard errors.[1] To account for time trends in the discussion of the pandemic on Twitter (see Figure S8 in the SI), we

[1] We used the `plm` package (Croissant and Millo, 2008) in `R`. Standard errors are computed using the methods proposed by Arellano (1987).

	Coefficient (S.E.)
State New Cases (per 10k)	0.00643^{***}
	(0.00090)
State New Deaths (per 10k)	-0.00963
	(0.01854)
State COVID-19 Policies	0.01091^{***}
	(0.00168)
National New Cases (per 10k)	0.00850^{*}
	(0.00374)
National New Deaths (per 10k)	0.35427^{*}
	(0.15275)
Other	0.01137
	(0.22458)
Republican	-0.26369^{***}
	(0.02236)
Other * State New Cases (per 10k)	-0.00399
	(0.01047)
Republican * State New Cases (per 10k)	-0.00386^{***}
	(0.00102)
Other * State New Deaths (per 10k)	0.06943
	(0.29646)
Republican * State New Deaths (per 10k)	-0.00581
	(0.02742)
Other * State COVID-19 Policies	-0.02338
	(0.01529)
Republican * State COVID-19 Policies	-0.01009^{***}
	(0.00222)
Other * National New Cases (per 10k)	-0.01967
	(0.01552)
Republican * National New Cases (per 10k)	-0.00063
	(0.00149)
Other * National New Deaths (per 10k)	0.16271
	(0.53586)
Republican * National New Deaths (per 10k)	-0.31286^{***}
	(0.06427)
Week	-0.07510^{***}
	(0.01381)
Week (quadratic)	0.00316^{***}
	(0.00085)
Week (cubic)	-0.00005^{**}
	(0.00002)
(Intercept)	0.69797^{***}
	(0.09590)
S.D. (observation)	0.49177
S.D. (legislator)	0.63501
S.D. (week)	0.03821
R^2	0.01601
Adj. R^2	0.01547
Num. obs.	122760

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Table 1: Regression model results. Model includes state fixed effects (unreported), as well as legislator and week random effects. Regression coefficients reported, with standard errors in parentheses. Standard errors are adjusted for serial correlation in the residuals.

include a cubic polynomial of time in the regression model. The polynomial includes three variables—the week number, week number squared, and week number cubed. Plümper, Troeger and Manow (2005) note that time effects can be used to absorb the effects of unmeasured variables on the time trend in panel data. The SI includes alternative specifications of the regression model, including different functional forms of the dependent variable and additional control variables. It also reports split sample models based on (1) gubernatorial partisanship, and (2) whether legislators are of the same party as the governor. The results are robust to these alternative specifications

The complete set of regression estimates is reported in Table 1.[2] The most notable findings from our analysis are that, compared to legislators from other parties, (1) Republican legislators tweet less about the pandemic overall, and (2) Republicans' frequencies of tweeting about the pandemic are driven less by pandemic health indicators and pandemic-related policymaking. These results emerge from the negatively-signed main and interaction effects for variables involving Republican Party members.

To aid interpretation of the interaction effects Figure 2 presents visual representations of the party-conditional effects of pandemic indicators on legislators' attention to the pandemic. In each plot, the y-axis gives the expected count of pandemic-related tweets per week for a legislator with median, or modal, values of the covariates not visualized in the plots. .

Among Democrats, three of the four health indicators exhibit positive and statistically significant (at the 0.05 level, two-tailed) relationships with the number of weekly pandemic-related tweets: state cases, national cases, and national deaths. Statistical significance is not an indicator of effect strength, especially given our large sample size, but we would not want to substantively interpret effects for which we fail to reject the null hypothesis of no effect. In terms of COVID-19 related policies, we find that, among Democrats, for each additional pandemic-related policy passed in a state in a given week, the expected number of tweets that week increases by 1.1% for legislators in that state—a relationship that is statistically significant. The largest effect by magnitude for Democrats is that of the

[2]The Adjusted R^2, at 0.015, is relatively low, which could be due to the inherently "bursty" nature of social media usage. As a robustness check, in the SI we report estimates with legislator fixed effects. These estimates are based only on within-legislator variation, and the overall Adjusted R^2 is higher (0.11 for Republicans and 0.13 for Democrats). We use split samples in this robustness check because party intercepts cannot be estimated along with legislator fixed effects in a pooled sample. The results are nearly the same, except the effect of national deaths is positive and significant for each party in the within-legislator models.

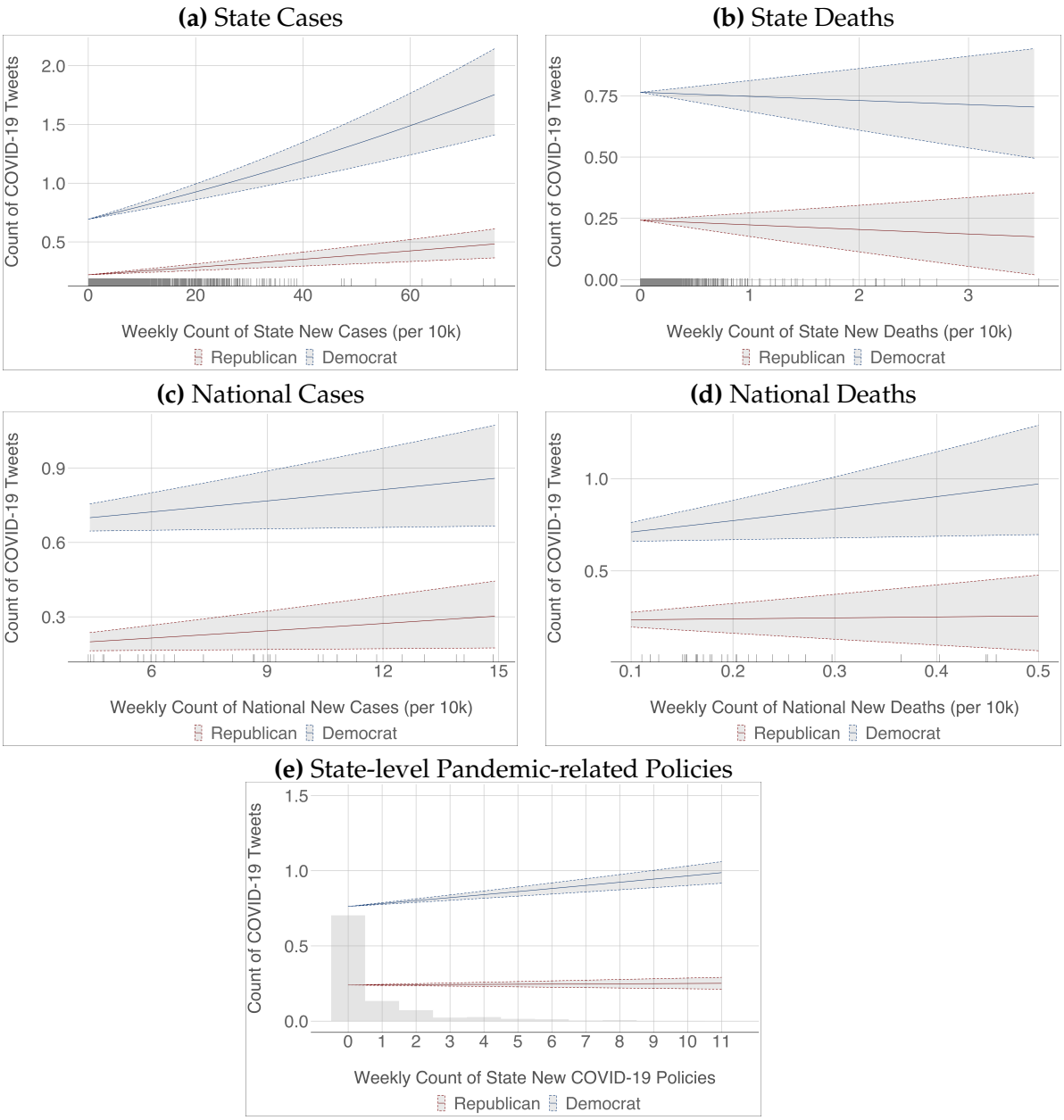

Figure 2: y-axis gives the predicted value for a legislator/week with median values of the variables not depicted in the plot. Grey bounds depict the 95% confidence intervals for the predicted value. The distribution of the respective independent variable is depicted in each plot. For the pandemic indicator variables, we use rug plots. For the number of policies passed, which takes on integer values 0–11, we use a histogram.

number of new cases. Shifting from a relatively low state case week to a relatively high state case week increases the expected number of tweets by approximately one full tweet.

The public health indicators and policy adoption counts have generally weaker effects among Republicans. While no statistically significant difference is found between Republicans and Democrats in terms of national cases, Republicans' discussion of the pandemic is statistically significantly less strongly associated with three of the other variables: state cases, national deaths, and policy adoption counts. In particular, Republicans' discussion of the pandemic on Twitter hardly correlates with national death count and pandemic-related policymaking. Among Republicans only state and national cases are associated with the weekly count of tweets. As with Democrats, state cases has the highest magnitude effect for Republicans. A shift from a relatively low state case week to a relatively high state case week increases the expected count of tweets by approximately 0.25 tweets. Given that Republicans, in their discussion of the pandemic on Twitter, focus more on keeping businesses and other institutions open than on health indicators, it is not surprising that their discussion is less reliably tied to health indicators.

Discussion

Especially early on in the pandemic, state governments were clear leaders in the majority of public policy issues that made up the response to the COVID-19 pandemic in the United States. Given the importance of elected officials' public discourse about major public policy issues, we analyzed the content and frequency of state legislators' discussion of the pandemic on Twitter. Relative to Republicans, Democratic and Independent legislators are focused heavily on the public health context of the pandemic and the intensity of their attention to the pandemic on Twitter increases when common health indicators—both at the national level, and within their states—spike. Republican legislators' attention to the pandemic, however, exhibits less systematic relationships with public health indicators, and is less frequent overall.

Our results regarding the relative lack of responsiveness of Republican state legislators' online discourse to pandemic indicators fits with the pattern of state politicians adopting partisan stances from the national political setting. From early in the pandemic, former president Donald Trump and other national Republican politicians, downplayed the

health impacts of the COVID-19 pandemic (Hatcher, 2020). Our findings indicate that state legislators quickly fell into the national partisan divide among political elites.

Our results have two important implications for researchers and practitioners going forward. First, in general, state policymakers' public discourse regarding a public health crisis is responsive to the severity of that crisis. Second, there is an elite partisan divide in both the framing and frequency of public discourse related to the COVID-19 pandemic—a divide that is likely to continue to shape the management of COVID-19 in the United States. In future work, the partisan dynamics of legislators' communication on social media could be further studied by analyzing the degree to which their discussions are directed at each other, as well as other political figures. For example, do state legislators use Twitter to publicly engage with other legislators, and/or governors of the opposite party? Such relational analyses are beyond the scope of the current paper, but could advance our understanding of how partisanship shapes public officials' communications on social media.

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