

# Please Let Science Talk: Presidential Sentiment and the Public's Risk Perception in the Era of COVID-19

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## **PLEASE LET SCIENCE TALK: PRESIDENTIAL SENTIMENT AND THE PUBLIC'S RISK PERCEPTION IN THE ERA OF COVID-19**

### **Abstract**

We examine whether and to what extent the presidential COVID-19 sentiment (PCS), constructed based on the former President Trump's tweets, has influenced the public's risk perception regarding COVID-19. We find that during the COVID-19 pandemic, PCS is negatively associated with social distancing behaviour in the Republican counties but is positively associated with social distancing behaviour in the Democratic counties. Our finding supports the view that individuals' risk perception is influenced by the information they receive from politicians through social media, with the impact exhibiting as variations with respect to the individuals' position on the political spectrum.

### **Introduction**

Social media has recently gained popularity as an information-sharing tool among politicians. For example, Donald Trump was the first U.S. president to use Twitter as a strategic instrument to connect with the public and disseminate his political claims and opinions, a phenomenon known as Twitter politics (Kreis, 2017). Previous literature suggests that political authorities are able to shape the public's thinking with the information they disseminate (e.g., Chaves-Montero et al., 2021; Hansen et al., 2021; Rao et al., 2021). In particular, individuals are more likely to listen to those politicians who share their political ideology (e.g., Mullainathan and Shleifer, 2005; Gentzkow and Shapiro, 2006; Barrios and Hochberg, 2020). The outbreak of COVID-19 is an ongoing global health crisis, which provides an empirical setting in which to examine how politicians use social media to communicate with the public and how the public responds to that information. In this paper, we examine whether and to what extent the presidential COVID-19 sentiment (PCS), constructed based on the former President Trump's tweets, has influenced the public's risk perception regarding COVID-19. We also study whether individuals' political partisanship plays an important role in their response to the former President Trump's tweets during the COVID-19 pandemic.

Politics in the United States have become more polarized, and Democrats and Republicans are more ideologically divided than ever. Several studies have shown that an individual's risk assessment is influenced by his or her political party, and, typically, the information the individual receives from the media comes from the same party (e.g., Bartels, 2002; Iyengar et al., 2012; Levendusky, 2013; Yeo et al., 2014; Coibion et al., 2019; D'Acunto et al., 2019). However, to the best of our knowledge, only a handful of studies have analysed politically polarized risk perception during the COVID-19 pandemic (e.g., Tisdell, 2020; Barberia and Gómez, 2021; Welsei, 2021). This study contributes to the understanding of the extent to which social media creates channels for communication between politicians and the public. In particular, investigating how the public has responded to the former President Trump's tweets through two different political lenses helps to uncover how partisanship influences the way the public consumes information on social media.

We collect the former President Trump's tweets from the Trump Twitter Archive ([thetrumparchive.com](http://thetrumparchive.com)) from 15 February 2020 to 30 December 2020. We keep tweets containing the Former President Trump's

original texts and exclude retweets, deleted tweets, and tweets containing only an HTTP link. To identify the former President Trump's tweets related to the COVID pandemic, we collect COVID-related keywords by continuously monitoring Twitter trending topics, keywords, and sources associated with COVID-19. These COVID-related words are summarized in the Supplementary Materials. The former President Trump's tweets are classified as COVID-related if the tweet contains at least one COVID-related word. To calculate the PCS score for each tweet in our sample, we conduct a social media sentiment analysis of the former President Trump's COVID-related tweets by using Valence Aware Dictionary and sEntiment Reasoner (VADER). VADER is a lexicon-based natural language processing tool that is especially attuned to sentiment analysis for social-media texts (Hutto and Gilbert, 2014). VADER sums the scores of all the words in the VADER lexicon following five linguistic heuristics. Consequently, sentiment is captured by the compound score of each tweet, which is normalized to range from -1, the most negative, to 1, the most positive (see the Supplementary Materials for details).

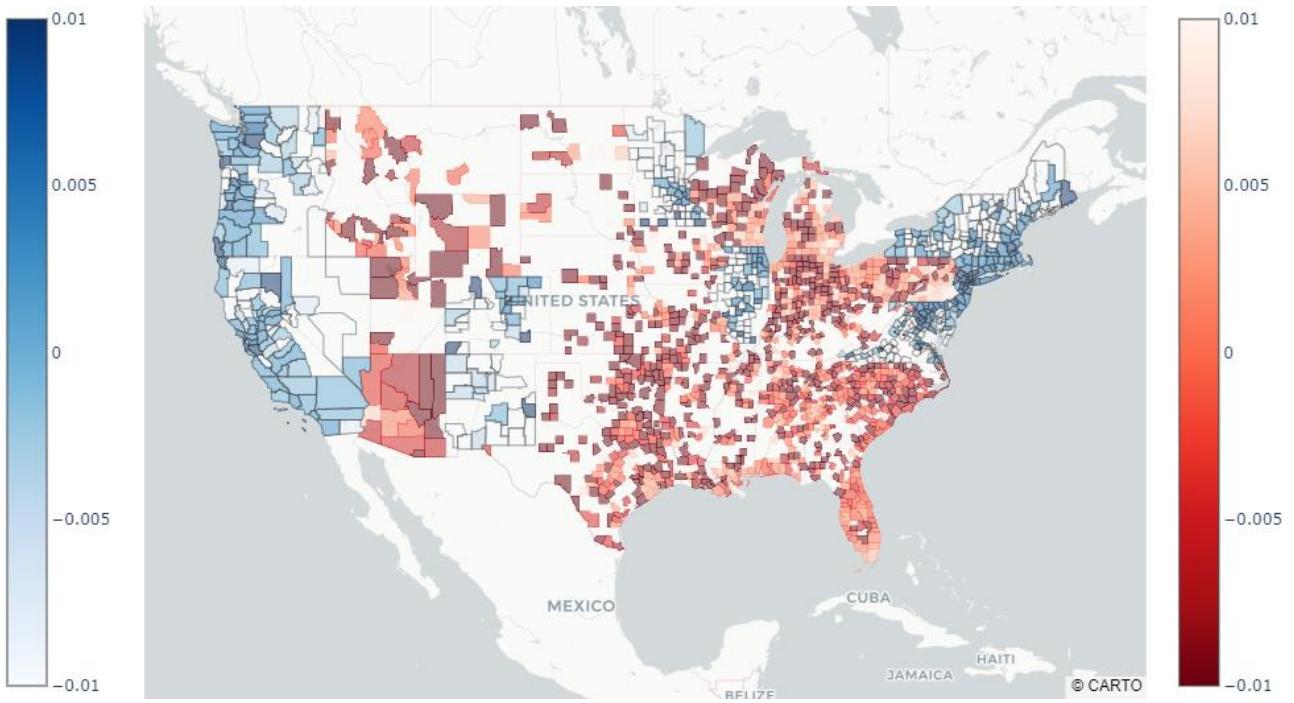
We collect media articles under the category for the novel coronavirus from Factiva, yielding 8,204 news articles. To capture county-level COVID-19 data, we collect daily confirmed cases and deaths from the COVID-19 Data Repository by the Centre for Systems Science and Engineering at Johns Hopkins University ([github.com/CSSEGISandData/COVID-19](https://github.com/CSSEGISandData/COVID-19)). In terms of demographics, we collect the population, median income, and the number of people over 25 who hold a bachelor's degree based on five-year estimates from the American Community Survey. Furthermore, we collect daily county-level mobility data on residential places from Google's COVID-19 Community Mobility Reports ([google.com/covid19/mobility](https://www.google.com/covid19/mobility)). The Google mobility data on stay-at-home activities reveals the level of public social distancing behaviour during the COVID-19 pandemic (e.g., Wang and Yamamoto, 2020; Noland, 2021; Yilmazkuday, 2021). Prior studies have suggested that an individual's mobility information reflects the degree to which his or her mobility is restricted during the pandemic; in our case, it captures individuals' risk perception during the epidemic (e.g., Kielland, 2016; Hsiehchen et al., 2020; Lawal and Nwengu, 2020). After merging the mobility data with the demographic and COVID crisis data based on Federal Information Processing Standards, our final sample contains 1,776 counties.

## Main Results

Our analysis begins by identifying how the PCS impacts the public's perception of risk associated with COVID-19. To explore the effect of political partisanship on risk perceptions, we separate so-called blue counties, those dominated by Democratic voters (in the lowest quartile of Trump voters), from red counties, which are dominated by Republican voters (in the highest quartile of Trump voters), based on the results of the 2016 U.S. presidential election. Figure 1 shows the results of ordinary least squares (OLS) regressions of social distancing behaviour (staying at home) on PCS at the county level. The variable *Stay\_at\_home<sub>t,t+2</sub>* is defined as the average daily mobility of individuals in a county regarding their residential visits over day *t* to day *t+2*, which manifests their perception of the risks associated with COVID-19. Details on the variables in our regressions are presented in the Supplementary Materials.

Figure 1 shows a noticeable partisan difference in the impact of PCS on the public's social distancing behaviour between Republican (red) counties and Democratic (blue) counties. PCS is negatively related to the public's tendency to stay at home during the COVID pandemic in 78.6% of Republican counties, but in only 44.7% of Democratic counties. Our finding supports the view that individuals' risk assessment

can be influenced by the information they receive from politicians through social media, with the impact exhibiting as variations with respect to the individuals' position on the political spectrum.

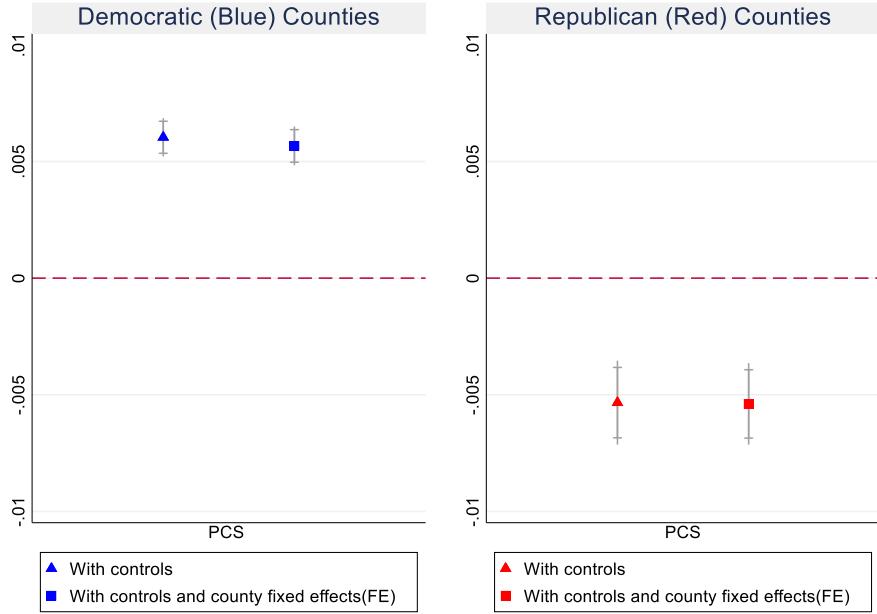


**Fig. 1: PCS and partisan social distancing behaviour, without controls.** This figure presents the correlation between  $Stay\_at\_home_{t,t+2}$  and  $PCS_t$  at the county level. The blue (red) bar on the left (right) indicates the correlation for counties that the former President Trump won (lost) in the 2016 presidential election. The correlations are higher for darker shades of colour.

Figure 2 shows that, after we control for the number of confirmed COVID-19 cases, other tweet sentiment, the ratio of COVID-19-related tweets, and demographic factors, there is a significantly negative relation between  $Stay\_at\_home$  and PCS in Democratic counties, but a significantly positive relation between  $Stay\_at\_home$  and PCS in Republican counties. After controlling for factors that could influence both PCS and the public's reaction to COVID-19, we confirm that PCS is associated with social distancing behaviour, with polarization of the association between Republican and Democratic counties. Since PCS represents the former President Trump's risk attitude towards COVID-19, people in Republican (Democratic) counties tend to view PCS as a confirmation (aberration) of cognition. It's that human cognitive biases, which are predisposed to take a confirmation (aberration) – to favor (discard) information that confirms (contradicts) their existing beliefs and ideology, thereby prioritizing the information received from different political lenses. Therefore, the increase in PCS is negatively (positively) related to the social distancing behaviour in Republican (Democratic) counties. Our finding highlights that PCS can induce a partisan bias among the public, resulting in polarized social distancing behaviour between Democratic and Republican counties.

To check the robustness of our finding, we also use the elected governor's political orientation to define whether a county is Democratic or Republican. We find a stronger negative effect of PCS on individuals'

risk perception of COVID-19 in counties where the elected governor is Republican (see Study 3 in the Supplementary Materials for more details).



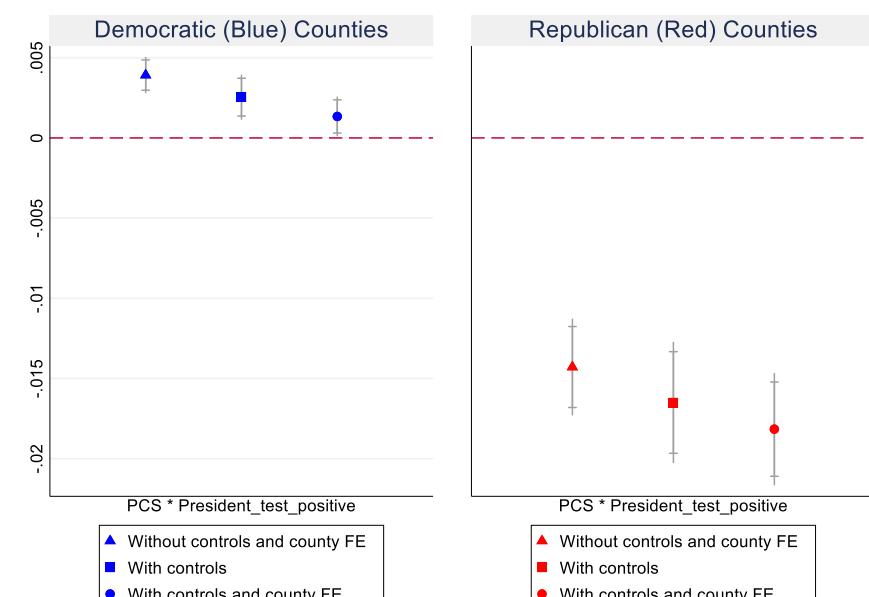
**Fig. 2: PCS and partisan social distancing behaviour, with controls.** This figure presents the results of the OLS regression  $Stay\_at\_home_{t,t+2} = \beta_1 PCS_t + \beta_2 \ln(Confirmed_{t,j}) + \beta_3 Other\_sentiment_t + \beta_4 Favourites\_of\_COVID\_tweets_t + \beta_5 Covid\_tweets_t/Total\_tweets_t + \beta_6 \ln(Income_j) + \beta_7 \ln(Population_j) + \beta_8 Education_j + County Fixed Effects + \varepsilon_{j,t}$ . The explanatory variable of interest is PCS. The plot on the left (right) reports the results for the sample of Democratic (Republican) counties. The point estimates of  $\beta_1$  and their 95% confidence intervals are also shown, and  $\beta_1$  is statistically significant at the 1% level for all specifications.

### Endogeneity Issues

So far, we find that PCS has a significant impact on social distancing behaviour and there is a clear partisan divergence between Democratic and Republicans. Since the relation between PCS and the public's COVID-19 risk perception proxied by social distancing behaviour could be jointly determined by unobserved factors, we address the potential endogeneity concern using a difference-in-differences (DID) identification method. We define an indicator variable *President\_test\_positive* as equal to one if the date is after the former President Trump and the First Lady tested positive for COVID-19, and zero if before. Figure 3 shows that the coefficients of  $PCS * President\_test\_positive$  are positive and statistically significant in Democratic counties, but negative and statistically significant in Republican counties. As reported by the British Broadcasting Corporation, the former President Trump continuously downplayed the severity of catching COVID-19 virus after he tested positive (e.g., <https://www.bbc.co.uk/news/election-us-2020-54427390>). If PCS reflects the former President Trump's risk attitude towards COVID-19, Democrats are more likely to show disagreement with PCS, thereby enhancing the aberration bias, suggested by the negative impact of PCS on social distancing behaviour in Democratic counties. Meanwhile, Republicans are more likely to show approval of PCS, thereby enhancing the confirmation bias, suggested by the positive impact of PCS on social distancing behaviour in Republican counties. Our finding shows that, after the former President Trump tested positive for

COVID-19, populations in Democratic (Republican) counties spent more (less) time in their residences as PCS increased.

One potential explanation for the polarizing impact of PCS on the public's risk perception involves omitted local economic factors that correlate with both local partisanship and local government policies related to COVID-19. To address this concern, we follow Sheng et al. (2021) and construct a measure of social connection-based partisanship (SCP), based on Facebook friendships between all the counties. The weight of SCP is the former President Trump's voting share in the 2016 presidential election. The measure is arguably exogenous to local factors in the focal county because it excludes counties located in the same state as the focal country. Our results suggest that residents in a county with stronger social connections with other Republican counties spent less time in residential places when PCS increased, which once again confirmed our main findings (see Study 4 in the Supplementary Materials for more details).

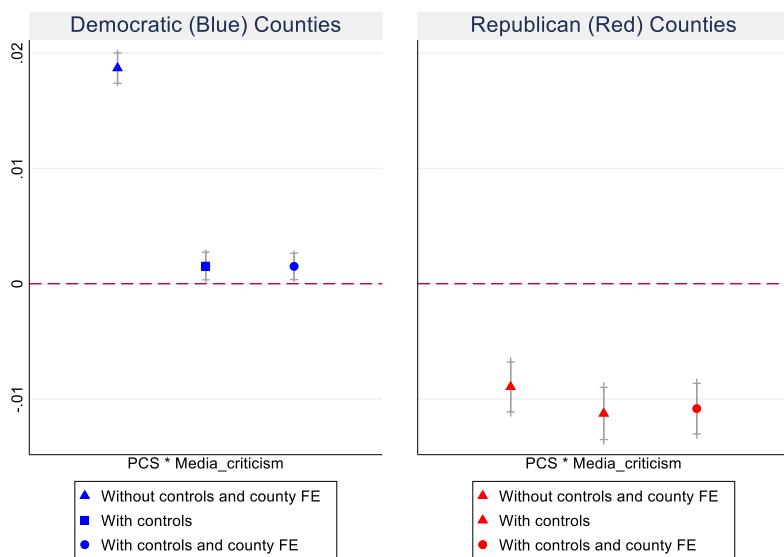


**Fig. 3: PCS and social distancing behaviour before and after the former President Trump tested positive for COVID-19.** This figure presents the results of the OLS regression  $Stay\_at\_home_{t,t+2} = \beta_1 PCS_t + \beta_2 President\_test\_positive_t + \beta_3 PCS_t * President\_test\_positive_t + \beta_4 Ln(Confirmed_{t,j}) + \beta_5 Other\_sentiment_t + \beta_6 Favourites\_of\_COVID\_tweets_t + \beta_7 Covid\_tweets_t / Total\_tweets_t + \beta_8 Ln(Income_j) + \beta_9 Ln(Population_j) + \beta_{10} Education_j + County Fixed Effects + \varepsilon_t$ . The explanatory variable of interest is  $PCS * President\_test\_positive$ . The plot on the left (right) reports the results for the sample of Democratic (Republican) counties. The point estimates of  $\beta_3$  and their 95% confidence intervals are also shown, and  $\beta_3$  is statistically significant at the 1% level for all specifications.

## Media Bias

There exists strong media bias in terms of ideology in the United States (Groseclose and Milyo, 2005). De Bruin et al. (2020) also find partisan preference among Americans consuming media news; that is, Democrats are more likely to watch MSNBC or CNN, whereas Republicans are more likely to watch Fox News. If this is the case, Democrats could be perceiving greater COVID-19 risk from news criticizing the

former President Trump. To examine the moderation effect of traditional media coverage, we include the interaction term  $PCS * Media\_criticism$  in our regression, where  $Media\_criticism$  is equal to one if the average sentiment of CNN news article headlines is negative according to the VADER classification, and zero otherwise. Figure 4 shows that the coefficients of  $PCS * Media\_criticism$  are positive and statistically significant in Democratic counties, but negative and statistically significant in Republican counties, suggesting that negative media coverage about the former President Trump enhanced the polarizing effect of PCS on the public's social distancing behaviour. Intuitively, Democrats (Republican) were more (less) likely to perceive the risk associated with COVID-19 from blue-leaning media, since the media disseminated information among their target audience, which enhances the aberration/confirmation of PCS. In other word, media criticism of the former President Trump enhanced the negative (positive) impact of PCS on the public's staying at home during the COVID-19 pandemic in Republican (Democratic) counties.

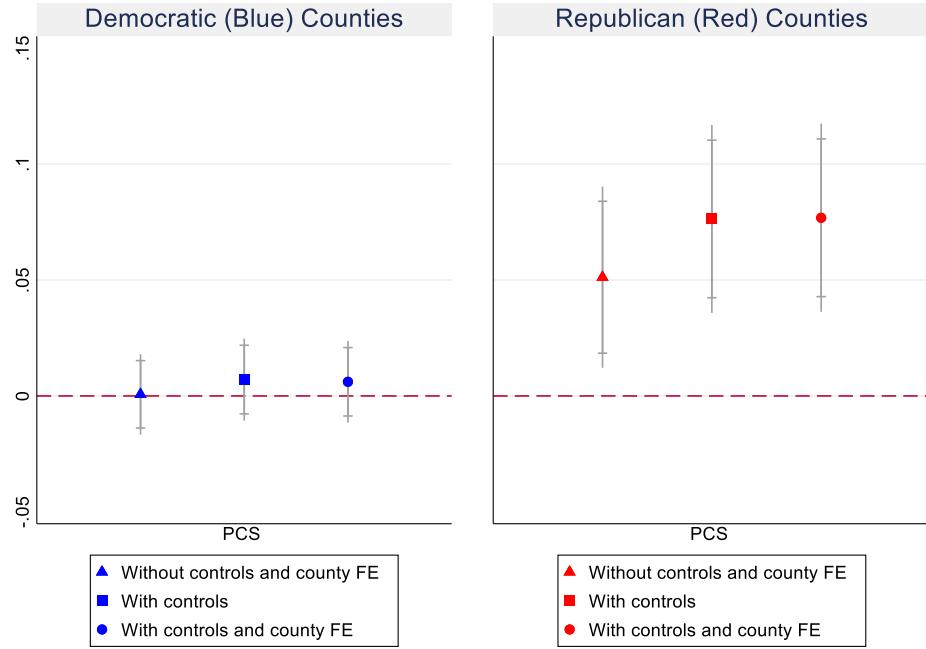


**Fig. 4: Moderation effect of traditional media.** This figure presents the results of the OLS regression  $Stay\_at\_home_{t,t+2} = \beta_1 PCS_t + \beta_2 Media\_criticism_t + \beta_3 PCS_t * Media\_criticism_t + \beta_4 Ln(Confirmed_{t,j}) + \beta_5 Other\_sentiment_t + \beta_6 Favourites\_of\_COVID\_tweets_t + \beta_7 Covid\_tweets_t / Total\_tweets_t + \beta_8 Ln(Income_j) + \beta_9 Ln(Population_j) + \beta_{10} Education_j + County Fixed Effects + \varepsilon_t$ . The explanatory variable of interest is  $PCS * Media\_criticism$ . The plot on the left (right) reports the results for the sample of Democratic (Republican) counties. The point estimates of  $\beta_3$  and their 95% confidence intervals are also shown, and  $\beta_3$  is statistically significant at the 1% level for all specifications.

## Coronavirus Cases

To explore the consequences of the PCS effect, we examine whether PCS has an impact on the growth ratio of COVID-19 cases. Figure 5 presents the results of OLS regressions of the growth ratio (GR) of COVID-19 cases in 21 days on PCS. As shown, PCS has a positive and statistically significant impact on the 21-day GR in Republican counties, a but statistically non-significant impact on the 21-day GR in Democratic counties. Our findings suggest that PCS not only has an impact on the public's COVID-19

risk perception, but also affects the growth rate of COVID-19 cases. These effects also vary between Republican and Democratic counties, consistent with our findings of public risk perception.



**Fig. 5: PCS and the GR of COVID-19 cases.** This figure presents the results of the OLS regression  $GR_{t+23} = \beta_1 PCS_t + \beta_2 \ln(\text{confirmed}_{t,j}) + \beta_3 \text{Other\_sentiment}_t + \beta_4 \text{Favourites\_of\_COVID\_tweets}_t + \beta_5 \text{Covid\_tweets}_t / \text{Total\_tweets}_t + \beta_6 \ln(\text{Income}_j) + \beta_7 \ln(\text{Population}_j) + \beta_8 \text{Education}_j + \text{County Fixed Effects} + \varepsilon_t$ . The explanatory variable of interest is  $PCS$ . The plot on the left (right) reports the results for the sample of Democratic (Republican) counties. The point estimates of  $\beta_1$  and their 95% confidence intervals are shown, and  $\beta_1$  is statistically significant at the 1% level for all specifications.

## Conclusions and Discussion

By studying the sentiment of the former President Trump's tweets during the COVID-19 pandemic, we discover a polarized effect of PCS on the public's risk perception of COVID-19 between Democratic and Republican counties. Those in Republican counties tend to view PCS as a confirmation, whereas those in Democratic counties tend to consider PCS as an aberration. Furthermore, we find that media coverage boosts political partisanship. Thus, the public's risk perception regarding health-related decisions and their behaviours are influenced by their political leanings, despite the nonpartisan nature of COVID-19.

Our results highlight the importance of social media in influencing public risk perception during the COVID-19 pandemic, especially when political polarization in the United States is on the rise. Understanding how the public reacts to the messaging of elected officials has important implications for public risk perceptions and health-related behaviour. Our findings provide evidence that social media can be used strategically for political purposes. Therefore, it is important to search for scientific evidence in a pandemic: let science take the lead during a health crisis to prevent politics from overwhelming the science.

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## Supplementary Files

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