

*Socially Distant: Did Social Capital Protect Parts of the  
U.S. from COVID-19 Conspiracy Theories?*

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## *Abstract*

In recent years, the spread of conspiracy theories across the U.S. has been troubling to many students of American politics. Public belief in conspiracy theories can reinforce prejudice, erode trust in government, reduce political participation, and encourage criminality. A great deal of research has been dedicated to understanding why some people believe false conspiratorial narratives, and numerous individual psychological, demographic, and political determinants have been identified. While this research is valuable, most of these determinants are difficult or impossible to address using public policy. Policies that increase social capital may offer a way for lawmakers to insulate their communities from the negative consequences of conspiracy theories. Social capital fosters feelings of self-efficacy, self-esteem, and interpersonal trust, reducing individuals' psychological motivations for conspiracy theory belief. Here, I use OLS analyses of Social Capital Index scores, Census data, election precinct returns, and a large dataset of COVID-19-related tweets to show that low social capital was a robust predictor of COVID-19 conspiracy theory activity in the U.S. during the spring of 2020. My results also indicate that ideologically right-leaning regions were considerably more susceptible to COVID-19 conspiracy theory belief than left-leaning regions. This paper contributes to the literature by identifying an important new determinant of conspiracy theory belief while suggesting a new approach that lawmakers might take in lessening the harmful effects of conspiracy theories.

## *Introduction*

Conspiracy theories are a trending topic, with voices on both sides of the aisle and from all levels of government expressing growing concern over their spread. President Joe Biden, The Department of Homeland Security, Surgeon General Dr. Vivek Murthy, and others have

emphatically warned the public about the threat conspiracy theories pose to Americans' health, democracy, public safety, and international reputation. (LeBlanc, 2021; Sands, 2021). The title of a recent installment of *The NPR Politics Podcast* captures the sentiment of many concerned political observers, proclaiming, "Conspiracy Theories Are Having A Moment – It's Bad For Democracy" (Davis, Elving, & Bond, 2023).

In response to this issue, researchers from several disciplines including political science, psychology, public health, communications, and sociology have generated a sizable body of literature on conspiracy theories. Their work has shown that these beliefs can reinforce prejudice (Bilewicz et al., 2013), reduce political participation (Jolley & Douglas, 2014b), and erode trust in government (Einstein & Glick, 2015). Deeply troubling is the connection between conspiracy theories and crime. Belief in this type of misinformation is associated with a wide range of illicit activity from tax evasion (Jolley et al., 2019) to political violence (Jolley & Paterson, 2020). These findings may come as little shock to those who watched as violent rioters carried signs bearing "Stop the Steal"—a phrase associated with the false belief that the 2020 U.S. presidential election was fraudulently manipulated in Joe Biden's favor—into the U.S. capitol building in early 2021.

False stories about the COVID-19 pandemic are a poignant example of the damage conspiracy theories can cause. COVID-19 hit U.S. soil in early 2020, beginning one of the most severe public health crises in recent American history. Spreading alongside the virus, an epidemic of COVID-related misinformation seemed nearly as contagious, causing widespread confusion, and reducing compliance with public health orders (Biddlestone, Green, & Douglas, 2020; Romer & Jamieson, 2020). COVID-19 conspiracy theories include:

- 5G network technology is the cause of COVID-19.
- COVID-19 was intentionally created as a bioweapon.

- COVID-19 is not real.
- Bill Gates created COVID-19 to implant the population with microchips.
- International organizations created COVID-19 to thin the world population.

It is reasonable to guess that, by causing many people to disregard the recommendations of health officials, these theories increased the spread of the virus and caused avoidable illness.

Prior research has made important strides towards understanding the determinants of conspiracy theory belief. For example, scholars have found that people who are highly prone to falsely inferring causal relationships (van der Wal et al., 2018), who are male (Freeman & Bentall, 2017), and who hold ideologically extreme ideas (van Prooijen et al., 2015) may be more easily swayed by conspiratorial narratives. While these insights are valuable, few of them offer a path forward for lawmakers who want to reduce the prevalence of conspiracy theories in their constituencies. Governments can do their best to mitigate the effects of some risk factors like unemployment and low educational attainment, but there is little hope that any public policy will be able to quickly and effectively address determinants like collective narcissism (Golec de Zavala et al., 2018), personal ideology (van Prooijen et al., 2015), and the tendency of individuals to erroneously perceive causality (van der Wal et al., 2018).

There is reason to believe that social capital may offer a way for lawmakers to address conspiracy theory beliefs more effectively. I propose that social capital, roughly defined as the resources and benefits available to individuals because of their membership in social networks, reduces conspiracy theory belief via at least three different mechanisms. By giving individuals the opportunity to participate in group decision-making, social capital increases feelings of self-efficacy (Han et al., 2015). By fostering feelings of belongingness and providing mechanisms of personal advancement, social capital raises group members' self-esteem (Han, 2015). By facilitating positive, repeated, and reciprocal relationships with members of their community,

social capital deepens interpersonal trust (Coleman, 1988). I theorize that these mechanisms reduce the perceptions of power imbalance, the need for ego-preservation, and the feelings of paranoia which make conspiracy theories appear convincing.

To date, there is some empirical evidence to support this idea. Low social capital in Ghana was associated with COVID-19 vaccine hesitancy, suggesting that those with stronger social ties may have been more willing to believe the information given to them by health officials (Morgan et al., 2023). Meanwhile, in the U.S., survey research on individuals finds a link between conspiracy theory belief and weaker social networks (Freeman & Bentall, 2017). These results are promising, but do not confirm, on an ecological level of analysis, that localities in the U.S. with high social capital experience less conspiracy theory activity than others.

Using county-level analysis, I provide evidence that social capital prevents the spread of conspiracy theories in the U.S. I measure the independent variable of interest—social capital—using the existing U.S. state- and county-level Social Capital Index data published by the U.S. Congress Joint Economic Committee’s Social Capital Project (2018). I control for the effects of several previously identified determinants of conspiracy theory belief including education, income, unemployment, race/ethnicity, female-to-male ratio, collective narcissism, and partisanship.

For this analysis, I focus specifically on the spread of COVID-19 conspiracy theories not only for convenience, but because of how quickly belief in these theories was measured following their inception. As a measure of the spread of these stories, I will use the international, location-tagged COVID-19 tweet database collected by the Crisis NLP project between February 2020 and March 2021 (Imran, Qazi & Ofli, 2022). I narrow this collection of over two billion tweets to those originating from the U.S. during the spring of 2020 and analyze them based on

hashtags and key terms. I test the relationship between social capital and conspiracy theory spread at both the state and county levels using multivariate OLS analyses.

### *Literature Review & Theory*

A large and growing line of interdisciplinary research outlines the threat that conspiracy theories pose to our social harmony, democracy, safety, and public health. Many determinants of conspiracy theory belief have been identified at an individual level of analysis, but little is known about the ecological causes of such beliefs. Declining social capital may be placing the U.S. at risk for the spread of conspiratorial narratives.

The term “conspiracy theory” describes a complex social phenomenon that is difficult to succinctly define. Despite a great deal of research having been conducted on the subject, scholars have struggled to agree on its definition (Douglas & Sutton, 2023). Noting this problem, Douglas and Sutton used a review of recent literature to delineate the contours of the term, formulating the following definition of “conspiracy theory” (2023).

A conspiracy theory is a belief that two or more actors have coordinated in secret to achieve an outcome and that their conspiracy is of public interest but not public knowledge. Conspiracy theories (a) are oppositional, which means they oppose publicly accepted understandings of events; (b) describe malevolent or forbidden acts; (c) ascribe agency to individuals and groups rather than to impersonal or systemic forces; (d) are epistemically risky, meaning that though they are not necessarily false or implausible, taken collectively they are more prone to falsity than other types of belief; and (e) are social constructs that are not merely adopted by individuals but are shared with social objectives in mind, and they have the potential not only to represent and interpret reality but also to fashion new social realities. (Douglas & Sutton, 2023, p. 282)

For example, the idea that the U.S. government planned and executed the September 11<sup>th</sup> attacks on the World Trade Center as a “false flag” event is a conspiracy theory because it is oppositional to popular narratives, describes malevolent actors conspiring in secret against the American public,

is implausible, and is an idea shared throughout some social circles. For the purposes of this paper, I will use Douglas and Sutton's definition of conspiracy theory (2023).

### 1. Are Conspiracy Theories Causing Harm?

The spread of conspiracy theories and misinformation can have serious consequences for civic health. While a handful of researchers have made the argument that conspiracy theories can benefit societies (for two noteworthy examples, see Clarke, 2002 and Miller, 2002), most social scientists have concluded that the negative effects of these narratives far outweigh the positive ones (Douglas et al., 2019). Conspiracy theories increase prejudice, decrease political participation, undermine trust in government, support criminal activity, and promote poor health choices.

Several studies have demonstrated that conspiracy theories can increase expressions of prejudice. In Poland, belief in a Jewish conspiracy was found to be more reliable than anti-Judaic religious beliefs in predicting the intent to discriminate against Jewish people (Bilewicz et al., 2013). Imhoff and Bruder used American survey responses to show that "conspiracy mentality," a measure of a respondent's general inclination to believe in conspiracy theories, is associated with prejudice towards various groups. They reported that "conspiracy mentality uniquely predict[s] prejudice over and above other well-established generalized political attitudes" (2014, p. 39). Slowing the spread of conspiracy beliefs could reduce the harms of prejudice and ethnic conflict.

Particularly relevant to political scientists, conspiracy theories are known to undermine some of the essential elements of a functional democracy. One of the oldest and most replicated findings in this area of research is that exposure to conspiratorial narratives decreases traditional forms of political participation. According to a natural experiment conducted by Butler,

Koopman, and Zimbardo, simply watching a film about the JFK assassination conspiracy theory decreased viewers' intentions to participate in three different political activities (1995). Intention to vote was most affected by exposure to the film, with 20% fewer participants reporting their intention to vote after leaving the theater compared to participants who were surveyed before entering the theater (1995). Several studies have since confirmed the demobilizing effect of conspiratorial narratives (Douglas et al., 2019; Jolley & Douglas, 2014b). Decreasing belief in these theories could bolster the health of democratic institutions.

The relationship between government trust and conspiracy theory belief is still not well understood. The two variables have been linked since at least the mid-90s (Goertzel, 1994), but scholars have struggled to determine exactly how they are causally related. Using an experimental design, Einstein and Glick demonstrated that exposure to a conspiracy theory, even when accompanied by a counterargument, decreases trust in government (2015). Still, numerous articles published on this topic operationalize low government trust as an independent variable that *predicts* conspiracy theory belief. One such examination, for example, shows that trust interacts with ideology and political knowledge to affect a respondent's likelihood of endorsing a conspiracy theory (Miller, Saunders, & Farhart, 2015). It is possible that there is a reciprocal relationship between the two, creating what Einstein and Glick termed a "vicious cycle of cynicism" (2013). At this point, it seems clear that these stories reduce public trust, and very possible that low trust, in turn, contributes to belief in these stories.

The circulation of conspiracy theories may also increase violence and criminal behavior. In 2019, a set of surveys in the UK showed that conspiracy theory exposure and belief increased respondents' intentions to commit petty crimes like knowingly selling a faulty belonging to someone else or falsely claiming a product refund from a store (Jolley et al., 2019). More



worrying, belief in these types of stories is associated with the opinion that political violence is justified (Jolley & Paterson, 2020). Radical extremist groups who follow through with acts of violence are more likely to promote conspiracy theories than non-violent extremist groups (Rousis, Richard, & Wang, 2020). The body of literature linking violence and crime to conspiracy theories suggests that preventing the proliferation of these narratives is important to public safety.

Conspiracy theories related to the COVID-19 pandemic convinced many Americans to shirk public health orders and make risky personal health decisions. During the crisis, those who believed in a COVID-related conspiracy were less likely to take recommended preventative measures like social distancing, staying home from social events, and washing their hands often (Banai, Banai, & Mukloušić, 2022). This may be because belief in such theories is associated with the perception that the virus does not pose a major health risk (Hughes et al., 2022). Exposure to and belief in anti-vaccine conspiracy theories reduces participants' willingness to get vaccinated against COVID-19 and other diseases (Jolley & Douglas, 2014a; Jennings et al., 2021; Morgan et al., 2023). Among a host of other determinants of vaccine hesitancy, Jennings et al. found that belief in an anti-vaccine conspiracy had the largest negative effect (2021). As we might expect based on these findings, COVID-19 incidence rates during the pandemic were higher in parts of the U.S. where a greater volume of COVID-related misinformation was disseminated via Twitter (Forati & Ghose, 2021). This suggests that misinformation caused avoidable illness. Preventing the spread of conspiracy theories, then, is an important measure to protect public health.

## 2. Why do we Believe Conspiracy Theories?

Literature on the determinants of conspiracy theories has exploded in recent years in response to a perceived increase in their prevalence. Some scholars maintain that features of our modern world like social media have facilitated a rise in conspiracy theory beliefs among the public (Dow et al., 2021). A series of studies on many such beliefs by Uscinski et al. refute this claim, finding that while conspiracy theory belief is common, it has not increased over recent decades (2022). Regardless of whether these beliefs are becoming more widespread over time, they are common enough and harmful enough to warrant a thorough investigation into their causes. Researchers have identified a long list of individual-level determinants of conspiracy theory belief including psychological, demographic, and political factors.

A significant portion of conspiracy theory research is carried out by psychologists and focused on identifying psychological variables that may cause individuals to be convinced by these narratives. Leading scholar of the field Karen Douglas, along with her colleagues Robbie Sutton and Aleksandra Cichocka, divided conspiracy belief motivation into three categories: epistemic (wanting to understand), existential (wanting to feel secure), and social (wanting to maintain positive relationships and self-image) (2017). Relating to epistemic needs, people who believe in conspiracy theories are likely to be prone to inferring false causal relationships (van der Wal et al., 2018), have lower analytical/higher intuitive thinking (Swami et al., 2014), experience delusional ideation at higher rates (Dagnall et al., 2015), and be characterized by several other traits that broadly limit their capacity to find accurate information (Douglas, Sutton, and Cichocka, 2017). Relating to existential needs, people who believe in conspiracy theories tend to be anxious and control-seeking (Douglas, Sutton, and Cichocka, 2017). Relating to social needs, people who believe in conspiracy theories are prone to collective narcissism (Golec de

Zavala et al., 2018), have low self-esteem (Abalakina-Paap et al., 1999), and are more likely to be members of disadvantaged or low-status groups (Douglas et al., 2019). In sum, psychologists have found that individuals believe in conspiracy theories when they seek certain truth, are not easily able to find accurate information, and are motivated by feelings of inferiority to defend their social status.

Demographically, those who subscribe to conspiratorial narratives differ from the population at large. Scholars have long noted a strong relationship between lower education levels and belief in conspiracies (van Prooijen, 2016). Freeman and Bentall's 2017 analysis of a large U.S. survey found that the shockingly high number of Americans who endorsed a conspiracy theory (over a quarter, weighted) were "more likely to be: male; currently unmarried; less educated; in a lower income household; outside the [labor] force; [and] from an ethnic minority group" (p. 595). These qualities suggest that the group of Americans who subscribe to conspiratorial narratives are socially alienated.

Political factors may also predict individual belief in conspiracy theories. As one might expect, the ideology of an individual appears to interact with the ideology of the alleged conspirator to affect conspiracy belief (Douglas et al., 2019). In other words, we are more likely to accuse people who are ideologically different from us of participating in a conspiracy. This effect seems to be even greater when the believer feels her political group has "lost" or is on the disadvantaged side of a power imbalance (Douglas, Sutton, and Cichoka, 2017; Freeman & Bentall, 2017). The feeling that they had lost, for example, may have contributed to the conspiratorial beliefs of the rioters who stormed the U.S. Capitol Building on January 6<sup>th</sup>, 2021. Additionally, ideological extremists at both ends of the ideology spectrum are more likely than moderates to endorse conspiracy theories (van Prooijen et al., 2015). The literature is mixed as to

whether there is an ideological imbalance in these beliefs; some studies find that conservatives are more likely to believe in conspiracies than liberals, while others find that there is no difference (Douglas et al., 2019). At present, it is clear that extreme ideologues are prone to believing that opposing ideologues are involved in conspiracies.

### 3. The State of Social Capital

The insights into conspiracy theory belief identified above are important but do little to inform public policy. This is, in part, because most studies on conspiracy theories have used individuals as a unit of analysis rather than geographical areas. Democratic governments have little to no control over the personal psychological traits, demographic features, or ideologies of their constituents. Social capital, on the other hand, is a possible determinant of conspiracy theory spread that can be influenced by public policy, offering a way for lawmakers to insulate their communities from the harmful effects of misinformation.

Modern literature on social capital began with the work of Bourdieu, who defined the concept as the “aggregate of the actual or potential resources which are linked to the possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition—or in other words, to membership in a group—which provides each of its members with the backing of the collectivity-owned capital” (1986, p. 286). Two years later, Coleman modified this idea, viewing social capital as the intangible products of social relationships (1988). He described three different categories of social capital: obligations, expectations, and trustworthiness of structures; information channels; and norms and effective sanctions (1988). These resources are said to be a necessary facilitator of production in society (1988). Although the field of social capital scholars is divided into a few different understandings of the precise

definition of social capital, their definitions all share a focus on the societal goods brought about by interpersonal relationships.

Despite initial widespread enthusiasm for exploring this concept, social capital research largely petered out over the last two decades as social scientists turned their attention to other ideas. Scholarly work from around the turn of the century, however, yielded two major insights about social capital that are relevant to the present research. Firstly, high social capital has been linked to numerous societal benefits including lower crime rates, greater economic growth, more effective schools, and better governance (Putnam, 2000; 1995). Secondly, social capital in the U.S. has been declining for decades (2000; 1995). More recent measures of social capital indicators in the U.S. confirm that this downward trend has persisted (Sawhill, 2020). A handful of politicians and activists continue to campaign in favor of policies designed to increase social capital. A 2020 report published by the Brookings Institution offered the following policy recommendations:

- Universal national service (military or civilian)
- Expanded tax incentives to encourage charitable donation
- Funding for local leadership (Sawhill, 2020)

These are only the recommendations of one source and many different policies have been proposed to increase social capital. The common element of all policies of this type is that they encourage or facilitate positive interactions between people.

#### 4. Theory

In addition to improving democratic institutions, public education, and economic gains, there is reason to believe that increasing social capital would lessen belief in conspiracy theories. Lewandowsky, Ecker, and Cook, in a 2017 essay, proclaimed that we are headed towards a “post-truth” era characterized by a never-ending conveyor belt of fake news and a complete

disregard for the opinion of experts. Social capital, they theorized, was a cause of this “dystopian” trend (2017).

Empirical evidence for the connection between social ties and conspiracy theory belief is scarce and comes primarily from two surveys. Analyzing a sample of older Ghanaian adults, Morgan et al. found that having social capital predicted greater willingness to receive a COVID-19 vaccination (2023). Although willingness to get a vaccination is a distinct concept from believing in conspiracy theories about the COVID-19 vaccine, vaccine willingness indicates at least some level of trust in the recommendations of public officials and scientists. This trust runs directly contrary to vaccine-related conspiracy theories, suggesting that those with social capital may have also been less inclined to believe such narratives.

Another survey from 2017 found a link between conspiracy theory beliefs and social relationships. Freeman and Bentall asked a large pool of U.S. adults about their belief in conspiracy theories, alongside questions about various psychological measures (2017). They found that respondents who subscribed to conspiratorial narratives had significantly weaker social networks, reporting that they struggled to establish close relationships with others and felt they could not rely on those close to them for help (2017). This suggests a connection between social capital and conspiracy theory belief at an individual level, but it is uncertain whether the same link exists on an ecological level of analysis.

Based on the work of other scholars, there are at least three possible mechanisms by which social capital could affect conspiracy theory belief. Firstly, social capital increases feelings of *self-efficacy* (Han et al., 2015). Feelings of self-efficacy should reduce an individual’s existential and political motives for conspiracy theory belief by giving her a feeling of control and weakening her perception that she is on the disadvantaged side of a power imbalance.

Secondly, social capital increases *self-esteem* (Han, 2015). Greater self-esteem may reduce an individual's social motives for conspiracy theory belief by reducing her need to explain her perceived shortcomings. Finally, social capital, by definition, increases interpersonal and institutional *trust* (Coleman, 1988). Feelings of trust are likely to reduce an individual's existential motives for conspiracy theory belief by calming feelings of anxiety and paranoia.

*Hypothesis: U.S. counties with greater social capital will display less conspiracy theory activity.*

I expect that social capital reduces belief in all types of conspiracy theories, but I examine only one group of theories during this analysis. I test my hypothesis by looking at the relationship between social capital and the volume of COVID-19 conspiracy theories discussed over social media. I measure social capital using the 2018 county-level Social Capital Index scores reported by the U.S. Joint Economic Committee's Social Capital Project. I measure COVID-19 conspiracy theory activity by the portion of COVID-19-related tweets originating from each U.S. state and county between March 11<sup>th</sup> and May 15<sup>th</sup> of 2020 that reference a popular COVID-related conspiracy theory hashtag. I develop two multivariate OLS models, one at the state- and one at the county-level of analysis, of conspiracy theory activity, accounting for the roles of education, income, race/ethnicity, unemployment, female-to-male ratio, partisanship, and collective narcissism.

For this analysis, I focus on the spread of COVID-19 conspiracy theories to limit the possible effects of endogeneity between conspiracy theory belief and social capital. Even if high conspiracy theory activity and low social capital tend to be found in the same places, the causal relationship between the two is likely two-directional, as suggested by Einstein and Glick (2013). Social capital could lower conspiracy theories, but conspiracy theories may also lower social capital. In the case of many older conspiracy theories, it is difficult to parse out the potentially

reciprocal relationship between the two variables because years of time often passes between when a conspiracy theory emerges in the public and when it is measured by scientists. For example, it would be nearly impossible to tell, based on a survey conducted today of belief in the theory that the U.S. government orchestrated the 9/11 attacks, whether social capital influenced the theory's development. The theory could have developed because of low social capital, low social capital could have developed because of the theory, the two could have been affected by a third variable, or the two could have mutually influenced each other in a "cycle of cynicism" (Einstein & Glick, 2013).

COVID-related conspiracy theories emerged suddenly and were measured quickly after their inception. In the fall of 2019, it can be stated with virtual certainty that COVID-19 conspiracy theories did not exist because COVID-19 did not exist. The first case of a COVID-19 infection in China was reported on December 12, 2019 (CDC, 2023). Because of this, it is certain that the amount of COVID-19 conspiracy theory activity measured in the spring of 2020 developed over the span of no more than six months. This measure, then, could not have been influenced by years of interaction between social capital and conspiracy theories. There is also no possibility that COVID-19 conspiracies affected the Social Capital Index measure used in this study, since the Social Capital Index was released in 2018.

It is certainly possible that COVID-19, either via the conspiracy theories circulated about it or the sudden change in social interactions that accompanied it, caused a change in social capital that could have, in turn, changed public belief in conspiracy theories. It is unlikely, however, that this entire process would have had time to take place in the limited period between the emergence of COVID-19 and the spring of 2020. Conspiracy theories about the virus were first observed by researchers in January of 2020 (Kuzelewska & Tomaszuk, 2022). COVID-19



restrictions in the U.S. began in mid-March of 2020 (Moreland et al., 2020)—about the same time as the collection of the tweets I will use in this analysis began (March 11<sup>th</sup>). The types of measures used in the U.S. Joint Economic Committee Social Capital Project’s Social Capital Index scores, like number of registered non-religious non-profits, marriage rates, and Census response rates, are relatively stable and are very unlikely to have changed substantially over the course of two months, let alone overnight. Additionally, common sense suggests that our interpersonal relationships do not often disappear after only a few weeks without face-to-face interaction. Although this research design does not entirely rule out the possibility of any effect of endogeneity between social capital and conspiracy theory belief, it very strictly limits it.

### *Research Design*

I test my hypothesis using an observational study of state- and county-level conspiracy theory activity and social capital, controlling for other variables that are likely to affect conspiracy theory activity. Both conspiracy theories and social capital operate primarily at the community level. By definition, conspiracy theories are a social phenomenon—"social constructs that are not merely adopted by individuals but are shared with social objectives in mind" (Douglas & Sutton, 2023, p. 282). Similarly, an individual cannot build social capital in a vacuum; they must have access to others who are able and willing to form relationships. Because of this, it is important when examining these variables to look beyond individuals by conducting broader, ecological analyses. Using states and counties as the levels of analysis shows how societal trends in social capital affect conspiracy theory behavior. Further, state- and county-level analyses may be most useful to local lawmakers crafting state and county policies. This analysis

sheds light on the community determinants contributing to belief in conspiracy theories, providing government officials with a path toward healthier democratic institutions.

#### 1. Dependent Variable: Conspiracy Theory Spread

I measure COVID-19 conspiracy theory activity by analyzing Imran, Qazi, and Ofli's 2022 dataset of over two billion COVID-19-related tweets collected via the Twitter API. I use only tweets posted between March 11<sup>th</sup> and May 15<sup>th</sup> of 2020, written in English, and originating from the United States (excluding Guam, the Virgin Islands, Puerto Rico, and the Northern Mariana Islands), for which location data is available. About 14% of the U.S. tweets are not tagged with a state, leaving roughly 129 million tweets in the state-level analysis. A greater portion of the U.S. tweets in the dataset (nearly 44%) are unable to be tagged with a county-level location. This leaves approximately 84 million tweets to be analyzed at the county level.

The tweet dataset I use includes the hashtags and key terms of every tweet. I automatically code tweets using a bag-of-words approach that assigns a dummy variable "1" for tweets that contain one of the search terms and a dummy variable "0" for tweets that do not contain any. The hashtags and key terms of every tweet are searched for the presence of each conspiracy-related hashtag along with several iterations of the hashtag using different common word-spacing formats<sup>1</sup>. The search is not case-sensitive. Although some tweets contain multiple conspiracy-related hashtags, tweets with any one or more hashtags are marked with a "1" for the presence of a conspiracy theory hashtag.

Then, I count and compile the number of tweets containing one or more of the hashtags originating from each state and county into a separate dataset. The total number of COVID-

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<sup>1</sup> For example, a tweet is marked as containing the hashtag "DeepStateVirus" if it contains the terms "DeepStateVirus," "Deep-StateVirus," "Deep State Virus," "Deep\_State\_Virus," "Deep-State Virus," "Deep-State\_Virus," "DeepState Virus," or "DeepState\_Virus."

related tweets, regardless of the presence of a search term, originating from each state and county are also counted and included in this dataset. I operationalize the number of COVID conspiracy-related tweets divided by the number of total COVID-related tweets from each state and county—the conspiracy tweet proportion—as the dependent variable. By using a proportion rather than the raw number of tweets, I control for the population size and the popularity of Twitter across states and counties.

I search the tweets for a collection of terms that have been associated with COVID-19 conspiracy theories in other literature. *Table 1* gives each search term, the COVID-related conspiracy theory it is associated with, and the paper that validated it as an appropriate search term. While it is possible, using this method, that some tweets could be misclassified as containing conspiracies based on hashtag, there is reason to think that this would only produce a small number of misclassifications. To begin with, all the tweets included in this dataset were selected based on being COVID-relevant. It seems unlikely that many tweets including hashtags like “5G” are discussing 5G networks and COVID-19 in the same tweet, but not referring to the conspiracy theory about 5G networks being a cause of COVID-19. Additionally, each of these hashtags has been found to be common specifically in conspiracy-related tweets by prior research. For example, during roughly the same period studied by the present analysis, the hashtag “GatesFoundation” was found by Moffitt, King, & Carley to be the third most common hashtag used by conspiracy-spreading tweets but was not included on the list of common hashtags used by non-conspiracy spreading COVID-related tweets (2021). There may be a handful of tweets using the hashtag “GatesFoundation” in a COVID-related tweet without referring to a conspiracy theory, but the number of these tweets is almost certainly very small.

Table 1

<b>Term</b>	<b>Related Conspiracy Theory</b>	<b>Source</b>
Plandemic	COVID-19 does not exist.	Lanier et al., 2022
Scamdemic		
Bioweapon	COVID-19 was created as a bioweapon.	Moffitt, King, & Carley, 2021
Gates Foundation	Bill Gates created COVID-19.	
5G	COVID-19 is caused and/or spread by 5G networks.	
CoronaVirusHoax	COVID-19 does not exist.	Monaci, 2021
CoronaHoax		
ChinaLiedPeopleDied	COVID-19 was created as a bioweapon.	Moonshot, 2020
KungFlu		
CPPVirus		
Chinazi		
China Is Terrorist		
FuckChina		
NukeChina		
BombChina		
DeathtoChina		
HoldChinaAccountable		
SorosVirus	The Jewish deep state created COVID-19.	
IsraelVirus		
NWOVirus		
CoronaVirusCoverup	The U.S. government covered up COVID-19.	
Depopulation	Bill Gates created COVID-19.	
DeepStateVirus		
5GCoronavirus	COVID-19 is caused and/or spread by 5G networks.	
FilmYourHospital	COVID-19 does not exist.	Ahmed et al., 2020
EndTheShutDown	COVID-19 is a bioweapon.	Forati & Ghose, 2021
DontStayAtHome		
BiologicalWarfare		
CovidPropaganda	COVID-19 does not exist.	
DefundTheFDA		
HealthFreedom		
GovernmentControl		
NoMask		
MaskFree		
CoronaBS		
BillGates	Bill Gates created COVID-19.	Thomas & Zhang, 2020

Event201		
BillGatesVirus		
BillGatesIsEvil		
BillGatesBioterrorist		
ArrestBillGates		
MarkOfTheBeast	COVID-19 vaccines are a biblical "mark of the beast."	
Agenda21	International organizations created COVID-19 to thin the population.	
Agenda2030	COVID-19 vaccines contain RFID chips.	
ID2020		
TheGreatAwakening		
StopConfinement	COVID-19 is not real.	
NoVaccineforMe	COVID-19 vaccine dangers are being concealed.	Muric, Wu & Ferrara, 2021
DoctorsSpeakUp		
VaccineInjury		
VaccineDamage		
BigPharma		
GovernmentLies	COVID-19 is not real.	Quinn, Fazel & Peters, 2021

## 2. Independent Variable: Social Capital

I take measures of county-level social capital directly from the U.S. Congress Joint Economic Committee's Social Capital Project Index. Both state-level and county-level index scores are available in this dataset. The state index was calculated based on twenty-five different variables categorized into seven subindexes: family unit, family interaction, social support, community health, institutional health, collective efficacy, and philanthropic health (Joint Economic Committee, 2018). The county index is similar, but analyzes fewer variables, generating subindexes only for family unity, community health, institutional health, and collective efficacy (2018). Variables include marriage rates, presidential vote turnout, organization membership, and violent crime, among others (2018). The authors of the index weighted the influence each variable had on the overall index score according to a principle

component analysis (PCA) so that variables more important to the concept of social capital would have a greater influence on index scores. The creators of the index validated their measure using several different methods, including by comparing the results of their index to social capital measures used by other scholars. They found that their index yielded similar results to those found by Putnam in 2000 and by Alesina and La Ferrara in 2000. A full list of variables, along with detailed methodology information, can be found in the report of the survey's findings.

The Joint Economic Committee published the Social Capital Index in 2018 and used datasets gathered between 2006 and 2016, with most data dated from 2013-2016 (2018). The index's close correlation with Putnam's state-level index created in 2001 (Joint Economic Committee, 2018) suggests that social capital is not volatile, strengthening the argument that this analysis does not suffer from problematic endogeneity between the independent and dependent variables. Changes to social capital happen slowly, so conditions were very unlikely to have changed much between the Joint Economic Committee's 2018 index and the COVID-19 pandemic in early 2020.

### 3. Other Independent Variables

To improve this model, I include other independent variables that have been shown to predict conspiracy theory belief or spread. Low education, low income, racial or ethnic minority status, unemployment, and male gender (Freeman & Bentall, 2017) are associated with greater risk of conspiracy belief. I use 2020 Census data to control for these variables. Marriage rates, which are expected to influence conspiracy theory belief (2017), are included in the model as a part of the Social Capital Index. Similarly, trust in government is accounted for by the model through the inclusion of a measure of confidence in institutions in the Social Capital Index. I will control for possible partisan differences in conspiracy theory belief (Douglas et al., 2019) using

2020 presidential election voting data from the MIT Election Data and Science Lab (2022).

Collective narcissism, or the tendency to believe that the group one identifies with is superior to other groups, is closely linked with conspiracy theory belief in literature. Because I am not aware of a county-level dataset on collective narcissism in the U.S., I will control for this in both analyses at the state level using the 2018 state-level collective narcissism index created by Putnam et al. (2018).

### *Results*

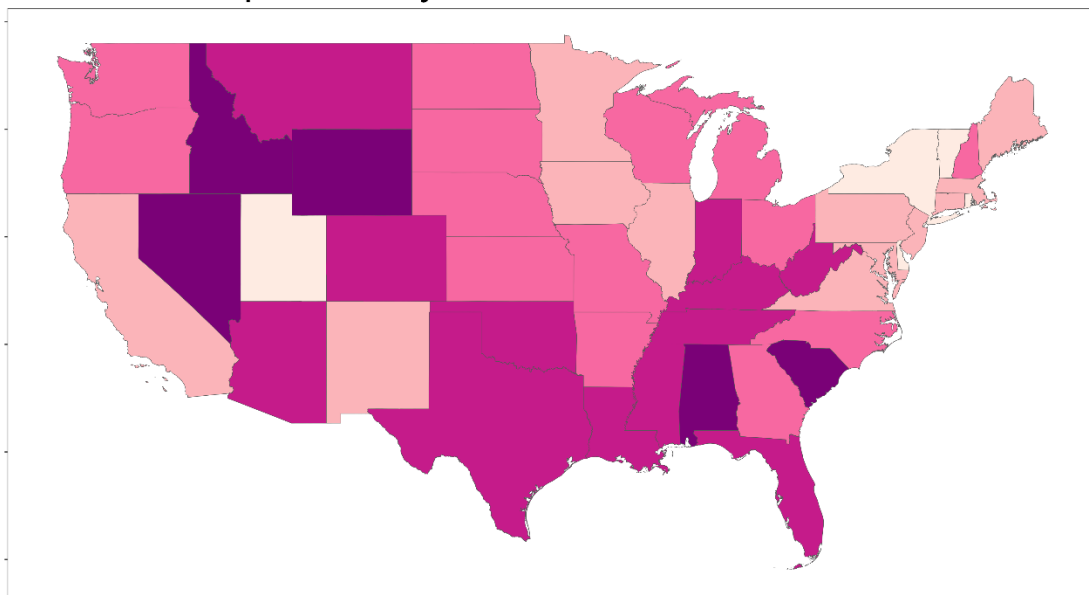
Overall, only 0.37% of COVID-related tweets originating from America during the studied period contained conspiracy theory hashtags, but there was a good deal of geographic variation in conspiracy tweet dissemination. The states with the highest rate of conspiracy tweeting, beginning with the highest, were Idaho, Alaska, Wyoming, Nevada, and Alabama. Of COVID-related tweets from Idaho, about 0.61% mentioned one of the listed conspiracy search phrases or hashtags. Vermont, Utah, New York, Rhode Island, and Delaware had the lowest portions of conspiracy tweets, with only about 0.24% of COVID-related tweets from Vermont containing one of the conspiracy search terms. *Figure 1* shows a map of the contiguous U.S. according to COVID conspiracy-related tweet proportion, with darker shades indicating a greater portion of conspiracy tweets.

A count of the number of hashtags referring to each different conspiracy theory in the sample revealed that COVID-19 conspiracy theory belief was driven by just a few theories. More than half of the conspiracy hashtags in the sample were associated with the belief that COVID-19 does not exist. About a quarter of the hashtags referred to the idea that the COVID-19 vaccine caused harmful effects that were being concealed from the public. An additional 15% of the

hashtags were related to the theory that COVID-19 was created as a bioweapon. References to all of the other theories examined—that 5G technology causes COVID-19; the government is covering up COVID-19; receiving the COVID-19 vaccine permanently gives one the “mark of the beast;” powerful Jewish groups caused COVID-19; the COVID-19 vaccine implants people with RFID chips; and the COVID-19 virus was created to intentionally thin the world’s population—in combination only make up about 8% of the conspiracy hashtags in the sample.

*Figure 1*

### COVID Conspiracies by State



*Figure 1 shows the contiguous U.S. by COVID conspiracy theory tweet proportion at the state level. Darker shades indicate greater conspiracy theory spread. The rural west and deep south regions published many conspiracy-related tweets, while the Midwest, the Northeast, and Utah published relatively few.*

I begin to test my hypothesis by examining the relationship between conspiracy tweet proportion and Social Capital Index score in U.S. states. *Figure 2* shows a scatter plot of these variables and a line of best fit in blue. COVID-19 conspiracy tweet proportion appears to decrease as social capital increases. An OLS test, weighted by total state population, supports my



hypothesis, showing that Social Capital Index is a significant predictor of conspiracy tweet proportion ( $p < 0.05$ ) and yields an adjusted  $r^2$  value of 0.083.

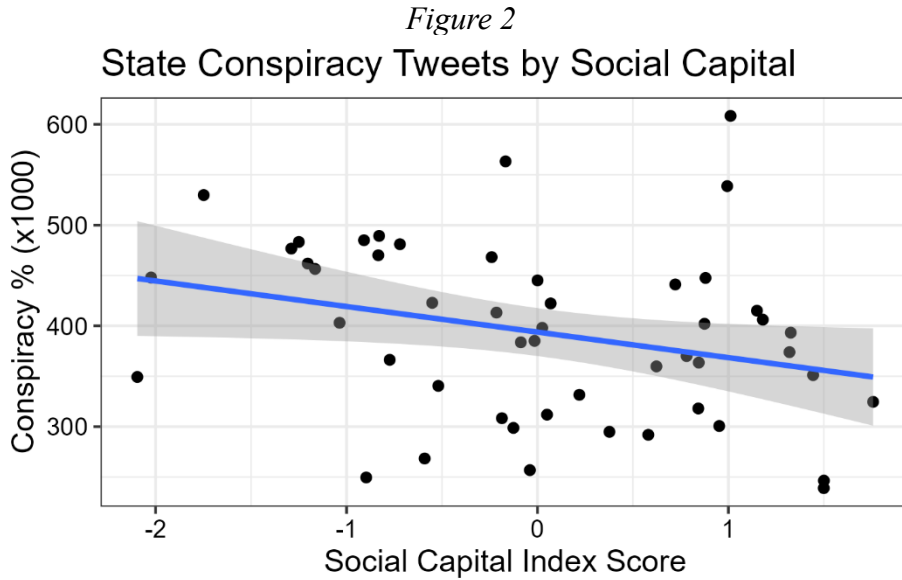


Figure 2 shows the percentage of all COVID-related tweets that contained a conspiracy theory hashtag in each state (x1000) by Social Capital Index scores. Conspiracy theory activity tends to decrease as social capital increases.

Table 1. State Conspiracy Theory Tweet Proportion

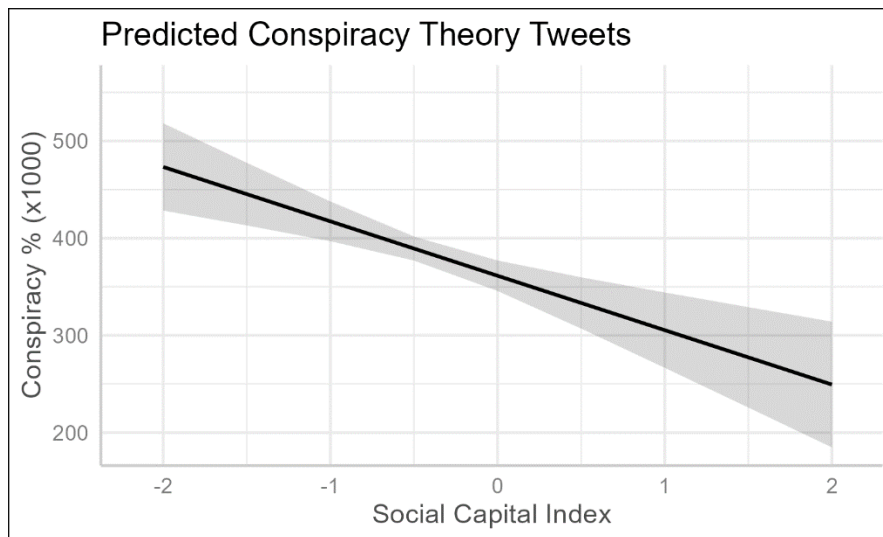
	Model 1	Model 2
Constant	372.128* (11.208)	604.798 (454.679)
Social Capital	-27.637* (11.876)	-55.963* (13.222)
Rep Vote 2020		791.343* (140.558)
Female:Male		-1143.380* (320.016)
Education		254.401* (98.529)
Income		18.434 (14.055)
Unemployment		-304.157 (1961.807)
Col. Narcissism		-6.145* (1.822)
R <sup>2</sup>	0.101	0.741
Adj. R <sup>2</sup>	0.083	0.698
Num. obs.	50	50

\* $p < 0.05$

Next, I test a multivariate model of state conspiracy tweet proportion as predicted by social capital and other relevant covariates. Social capital remains significantly negatively associated with conspiracy tweet proportion when 2020 presidential vote share, female-to-male ratio, education, income, unemployment, and collective narcissism are controlled for. Racial diversity is not a significant predictor of conspiracy theory tweet portion, but is somewhat highly correlated with social

capital, education, and voting. To reduce multicollinearity, I drop racial diversity from the model. The complete model yields an adjusted  $r^2$  value of 0.698, explaining nearly 70% of variation in conspiracy theory activity. The bivariate and multivariate models of state COVID-related conspiracy theory activity are shown in *Table 1*. *Figure 3* shows a prediction plot of conspiracy theory tweet proportion by Social Capital Index score for states, with control variables held at their mean. These results suggest that if a state went from having a very low Social Capital Index score (-2) to a very high Social Capital Index score (2), their conspiracy theory activity could be reduced by about 45%.

*Figure 3*



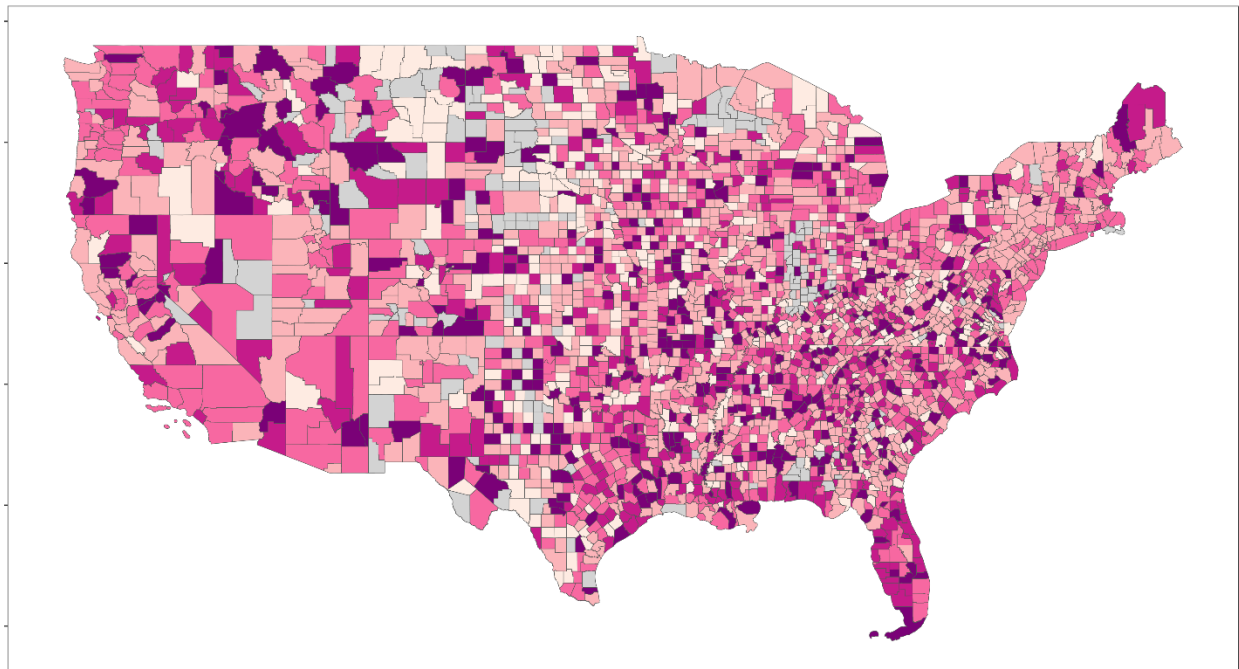
*Figure 3* shows the predicted conspiracy theory tweet percentage (x1000) by social capital for states when control variables are held at their mean.

Because social capital is expected to operate on a local level, it may be useful to look at the county-level effects it has on conspiracy theory belief. I analyze conspiracy-related tweets at the county level to confirm my state-level results. *Figure 3* shows a map of the contiguous U.S. by COVID-19 conspiracy theory tweet proportion, with darker shades representing greater proportions of conspiracy-related tweets. Counties without Social Capital Index scores were not analyzed and are shown in grey. Many of the counties with the highest portion of conspiracy-

related tweets were from the rust belt, south, and rural west regions of the U.S. For example, of counties from which more than 400 COVID-related tweets were published during the time studied, Mifflin County, Pennsylvania had the highest conspiracy tweet proportion, with more than 5.2% of COVID-related tweets originating from that county containing one of the conspiracy search terms. During the spring of 2020 then, more than one in every 20 COVID-related tweets originating in Mifflin County was about a COVID-19 conspiracy theory. Other top conspiracy-tweeting counties included Ashland County, Ohio; Caribou County, Idaho; Switzerland County, Indiana; and Shackelford County, Texas.

*Figure 4*

## COVID Conspiracies by County



*Figure 3 shows the contiguous U.S. by COVID conspiracy theory tweet proportion at the county level. Darker shades indicate greater conspiracy spread. Counties with no data are shown in grey. Many of the counties with the greatest COVID-19 conspiracy theory activity are found in the rust belt, rural west, and south regions.*

In some small counties, few total COVID-related tweets were published during the studied time frame. Since, on average across all counties, only a little over one in every 300 COVID-related tweets contained a conspiracy theory hashtag, I do not expect the conspiracy theory tweet portion to be a reliable measure of conspiracy theory activity in counties from which fewer than 400 tweets were published during the timeframe. Still, it is important to analyze the conspiracy theory beliefs of both urban and rural areas. For this reason, conspiracy theory tweet proportion data is imputed for the 359 counties that published fewer than 400 total COVID-related tweets. The tweet proportion data is generated using classification and regression trees (CART), which predicts the conspiracy theory tweet portion for each of the 359 counties based on the conspiracy theory tweet portion of other counties with similar qualities.

Additionally, conspiracy tweet proportions were logged to make the variable more normally

distributed and to better satisfy the assumptions of the OLS model. As in the state models, the county models were weighted by total population.

Table 2. County Conspiracy Theory Tweet Proportion

	Model 1	Model 2
Constant	10.243* (0.021)	8.670* (0.629)
Social Capital	-0.081* (0.020)	-0.228* (0.029)
Rep Vote 2020		0.800* (0.150)
Female:Male		0.754 (0.454)
Education		0.031 (0.095)
Income		0.119* (0.022)
Unemployment		-0.486* (0.096)
Col. Narcissism		-0.015* (0.005)
R <sup>2</sup>	0.006	0.045
Adj. R <sup>2</sup>	0.005	0.043
Num. obs.	2932	2932

\* $p < 0.05$

I conducted bivariate and multivariate OLS analyses of COVID conspiracy-related tweets at the county level. Confirming my hypothesis and the results of the state-level model, social capital is a significant predictor of conspiracy theory activity at the county level ( $p < 0.05$ ). As I did in my state-level

analysis, I created a multivariate OLS model to predict COVID-19 conspiracy theory spread at the county level. Social capital remains a significant predictor when control variables are accounted for.

The county-level analysis I have presented here is valuable because it confirms that the relationship between social capital and conspiracy theory tweet proportion exists at the local level. The resulting models, however, hold less predictive power than the state-level models. The county-level model can only explain about 4.3% of conspiracy theory activity variation (adjusted  $r^2 = 0.043$ ), while the state-level model is able to explain nearly 70% of variation. This result is not surprising given the much greater amount of noise in the county-level data when compared to the state-level data. As mentioned earlier, the residents of many small counties only published a handful of total COVID-19-related tweets during the studied time. This resulted in an abnormal distribution of conspiracy theory tweet portions. The main utility of the county-level analysis, then, is as a local-level robustness check of the state-level findings. A county-level analysis of only one state, examining a longer period of time, may yield a more reliable county-level model of conspiracy theory activity and state capital.

### *Discussion*

Several important points should be noted about these results. Firstly, the descriptive results indicate which parts of the U.S. experienced the greatest (and least) amount of COVID-19-related conspiracy theory activity during the early months of the pandemic. The deep south and rural west regions of the country (apart from Utah) were hardest hit by conspiratorial narratives. Conspiracy theory activity in the rust belt region varied widely from county to county, with some counties having very high conspiracy theory tweet proportions, while others had low

proportions. New England, meanwhile, experienced little conspiracy theory activity during the time studied.

Secondly, social capital may offer a promising path forward for both lawmakers hoping to reduce conspiracism and researchers hoping to better understand conspiracy theories. It may be possible for lawmakers to protect their states and counties from harmful conspiracy theories by increasing social capital. This can be done by enacting policies that increase positive interpersonal interaction and facilitate collective action. Funding local organizations, incentivizing philanthropy, and encouraging community service may help to expand citizens' social networks, leading to a long list of positive societal outcomes including lessened conspiracy theory activity. Meanwhile, the finding that low social capital predicts conspiracy theory spread should be further explored by researchers. Future studies should work to confirm the causal direction between the two variables, to confirm the theorized mechanisms by which social capital affects conspiracy theory belief (feelings of self-esteem, self-efficacy, and interpersonal trust), and to identify the best ways to increase social capital.

Thirdly, the results of this analysis are cautiously supportive of the finding that conservative ideology contributes to conspiracy theory spread. As some researchers have concluded, conservative ideologues may simply be more prone to belief in conspiratorial narratives. This assertion certainly fits with the present data, and with the work of several other scholars (Miller, Saunders, & Farhart, 2015; Galliford & Furnham, 2017). It is also possible, however, that the connection presented here between Republican voting and conspiracy theory belief is better explained by the previous finding that people feel more accepting of conspiracy theories when they perceive themselves to be on the losing side of a conflict (Douglas, Sutton, and Cichoka, 2017). At the time this data was collected, the Republican party had just lost an

incredibly contentious national election and may have been especially motivated to perceive government conspiracies. Because previous findings about whether a connection exists between ideological leaning and conspiracism are mixed (Miller, Saunders, & Farhart, 2015; Galliford & Furnham, 2017; Oliver & Wood, 2014), future research should further test and explore the nature and existence of this connection.

The analysis presented here has several limitations. Firstly, there is no way that I am aware of, using the present dataset, to detect whether some of the tweets analyzed here were published by Twitter bots. The presence of bots on social media sites today should be assumed, and it is likely that some number of bot-generated tweets have been included in my final dataset. While this may be troubling to some readers, there is little reason to think that the presence of some bot-written tweets in this dataset affects my main finding. It seems very unlikely that bot-generated tweets would happen to geolocate themselves in areas that confirm my hypothesis about social capital. The presence of bot-created tweets, then, should only make my findings noisier and more conservative. Still, the tweet dataset could be further validated by comparing it to other measures of conspiracy theory activity, spread, or belief.

Additionally, different methods of text analysis might have yielded a more precise dataset of conspiracy-related tweets. For this analysis, I used a bag-of-words approach to determine whether tweets are COVID conspiracy theory-related or not. This method may have coded some tweets incorrectly. For example, popular COVID-19 conspiracy hashtags that were not validated by prior research may have been overlooked, causing some conspiracy-related tweets to be misclassified. Using hand coding or machine learning to identify conspiracy-related tweets could correct this type of misclassification. Finally, this analysis only examined COVID-related conspiracy theories, and the results may not be generalizable to all conspiracy theories. It is

possible that the types of conspiratorial narratives spread about COVID-19 were in some way different or were spread differently compared to other types of conspiracy theories. Future scholarship could look at the relationship between social capital and other common conspiracy theories.

Here, I have identified low social capital as a determinant of conspiracy theory activity in the U.S. and presented a working model for conspiracy theory activity. Low social capital and high Republican presidential vote share emerged as important predictors of conspiracy theory activity at all levels. Government entities should use policy to encourage the growth of social capital in their regions and lessen the harmful effects of conspiracy theories.



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