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Policy responsiveness and institutions in a federal system:
Analyzing variations in state-level data transparency and equity issues during the COVID-19 pandemic

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ABSTRACT

In the absence of a coherent federal response to COVID-19 in the United States, state governments played a significant role with varying policy responses, including in data collection and reporting. However, while accurate data collection and disaggregation is critically important since it is the basis for mitigation policy measures and to combat health disparities, it has received little scholarly attention. To address this gap, this study employs agency theory to focus on state-level determinants of data transparency practices by examining factors affecting variations in state data collection, reporting, and disaggregation of both overall metrics and race/ethnicity data. Using ordered logistic regression analyses, we find that legislatures, rather than governors, are important institutional actors and that a conservative ideology signal and socio-economic factors help predict data reporting and transparency practices. These results suggest that there is a critical need for standardized data collection protocols, the collection of comprehensive race and ethnicity data, and analyses examining data transparency and reductions in information asymmetries as a pandemic response tool—both in the United States and globally.

1. Introduction

As of May 25, 2022, official statistics indicated that the COVID-19 pandemic resulted in the infection of over 83,408,645 Americans and killed 1,000,254 Americans [1]. While the COVID-19 pandemic was touted in some narratives as “the great equalizer,” like other disasters, it has disproportionately affected socially disadvantaged groups, including Black, Latinx, and Native American communities and low-income populations who are at increased risk due to long-lasting systemic health and social inequities [2]. In the absence of a coherent federal response in the United States, state governments have played a significant role in addressing the COVID-19 pandemic. However, state governments have varied widely in terms of the measures they have adopted to mitigate the effects of the pandemic, such as school and workplace closings, travel restrictions, stay-at-home orders, and restrictions on public gatherings. State responses have also varied in how they have addressed immediate and long-standing health disparities and associated inequities and, in their use, timing, and adoption of policy tools and instruments such as data collection, data reporting, and data disaggregation.

Early in the pandemic in February and March 2020, the federal government, particularly former President Trump, sought to downplay the gravity and potential spread of COVID-19. State governments sought to address the health effects of the pandemic in various ways but were also remiss in reporting key metrics. More specifically, states varied in how they defined and reported key

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metrics, such as testing data, cases, hospitalizations, and deaths. For instance, during the first wave of the pandemic, it was reported that a third of states were not even reporting hospital admission data, which was key to understanding the surge in the spread of the virus [3]. In Virginia, Texas, Vermont, and Georgia, health departments were initially including antibody tests along with diagnostic tests [4]; in Georgia, this inflated the state’s overall testing count by nearly 78,000, leading to the publication of misleading charts of new confirmed cases showing a downward trajectory, until news reports covered how the two tests had been combined [3,5]. Variations across states in terms of data collection and reporting were exacerbated by the absence of clear national guidelines about how testing data should be reported [6].

State reporting on race and ethnicity data has also varied in terms of its completeness and accuracy. The number of states reporting race and ethnicity data for testing, case rates, hospitalizations, and deaths were fairly low at the start of the pandemic in March and April 2020 [6]. Even as more states began reporting race and ethnicity data for certain groups, data for other minoritized groups, including Latinx, Asian American/Pacific Islander, and Native American communities, were systematically missing or not accurately captured in data collection efforts. The lack of accuracy has stemmed from many sources, ranging from the paucity of testing sites, particularly in the early months of the pandemic in hard-hit minority communities [7], to the lack of reporting of cases in which the race and/or ethnicity was known [6]. Even though these data were central to understanding the extent of the disparate effects of the COVID-19 crisis, they were not available in various states. The American Medical Association dubbed it the “pandemic’s missing data” and called on “laboratories, health institutions, state and local health departments and the Department of Health and Human Services to standardize, collect and publish race and ethnicity data” to prioritize equity and more effectively manage the pandemic [8] para. 4.

The problems with data collection and transparency in state responses are particularly significant for two main reasons. First, states used test positivity rates to determine appropriate policy responses, including lockdowns, reopening, restrictions on businesses and organizations, and protections for vulnerable populations such as essential workers and older residents. However, the problems with testing and the misreporting of data in several states, with issues such as combining antibody tests with PCR testing, meant that the data were not reliable [9]. Yet, these data were used by states to justify re-openings and to loosen restrictions [6]. Second, to combat health disparities and effectively fight COVID-19, it is critical to understand its impact and spread among communities of color and marginalized populations, given its disproportionate impacts in these communities. But the lack of standardization in data collection and the variations among states in reporting race and ethnicity data made it difficult to target testing and offer protections for those who needed it, particularly in minority communities.

We address these issues by looking at data transparency and equity as seen by state variations in the comprehensiveness of their reporting of health metrics and variations with respect to data disaggregation of race and ethnicity metrics. We view this through the theoretical lens of agency theory, focusing on state political institutions and policy responsiveness to the ideological preferences of citizens, citizen needs, and socio-economic vulnerabilities. Our argument holds that the fragmented nature of COVID-19 policy responses has created differential state-level information asymmetries between public officials (the agents) and the citizenry (the principal). We analyze determinants of state-level data transparency practices to understand the factors that have contributed to such asymmetries. A discussion of transparency and agency theory follows, succeeded by a discussion of our data, variables, methods, and findings. Our conclusions suggest policy recommendations to address information asymmetries and promote better data equity and transparency practices. The importance of standardizing data and death counts on a global level and examining the issue in other federalist countries is also briefly discussed.

2. Theoretical foundation

Governmental transparency is commonly defined as the action of offering citizens access to information through various mechanisms to allow individuals to understand the inner workings of the state, thus enhancing the accountability of public officials to citizens [10,11]. Fung [12] discussed four principles of transparency: information about the actions and operations of the public organizations that affect citizens should be rich and made publicly available; the amount of information made available should be proportionate to the degree to which citizens’ interests are jeopardized by public organizations; information should be provided to the individuals and groups most likely to use said information; and political, social, and economic structures should be organized so as to allow citizens to use information to take action. Transparency has the potential to enhance citizen satisfaction, participation, trust in government, and governmental legitimacy, while reducing secrecy and corruption [13]. Democratic accountability benefits alongside an increase in transparency, as the dissemination of information gives citizens the opportunity to scrutinize public decisions and decision-making processes [14]. Information, however, is an imperfect public good marred by asymmetries and substantial barriers to access [15], and much like other public sector processes, transparency is subject to faulty and ineffective applications [13]. Hence, it is important to analyze the factors contributing to governmental transparency to better understand why asymmetries exist and how they may be reduced.

This study examines determinants of transparency—defined as the accurate collection, disaggregation, and dissemination of COVID-19 data—through the theoretical lens of agency theory. According to agency theory, a relationship exists between a principal and an agent wherein the agent carries out tasks for the principal; however, the agent has the incentive to hide information from the principal, leading to a loss of welfare [16]. In public administration, public officials act as agents on behalf of the citizenry, the principal [17]. Problems arise when the relationship between the citizenry and the state encounters information asymmetries that necessitate the use of different mechanisms aimed at holding agents accountable to the principal [17]. Releasing information that allows for state actors to be monitored by those they aim to serve increases the chances of achieving accountability [18]. The result is a reduction in information asymmetries through greater transparency and an enhancement in trust in government [11], in addition to a positive impact on democratic practices such as citizen involvement [12]. Governmental transparency thus possesses the ability to
reduce the information asymmetries that hinder democratic practices in the relationship between public officials as agents and the citizenry as the principal.

Transparency can also enhance the legitimacy of governmental actions (see Refs. [11,19]). Legitimacy is defined as “a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions” [20, p. 574]. Organizations commonly disclose pertinent information to stakeholders to promote legitimacy [21]. In the public sphere, this increased disclosure and dissemination of information—i.e., the enhancement of transparency and reduction in information asymmetries—has a positive effect on public perceptions of state decisions [22]. The legitimacy of governmental decisions improves alongside transparency mechanisms that give citizens a look into public sector decision-making processes [23]. Information diffusion and dissemination holds public officials accountable to citizens, increases citizen’s understanding of public decision-making, promotes an image of good governance, and helps public officials legitimize actions and gain the confidence of the citizenry [24]. Transparency can be improved by opening government data up to the public, an action which gives citizens a window through which to examine the inner workings of the state and reduces extant information asymmetries, though it should be noted that inaccurate and/or manipulated data may further perpetuate such asymmetries [19]. It is thus beneficial for public officials as agents to enhance legitimacy and reduce information asymmetries by accurately collecting and disseminating information to the principal in a transparent fashion.

3. Federalism and State-Level Variations in data transparency and reporting

Though the term federalism does not appear in the U.S. constitution, it is one of the most important features of American democracy. While the appropriate roles for the states and the federal government have been fiercely debated, states have often served as “laboratories of democracy” [9]; p. 595; quoting former Supreme Court Justice Louis Brandeis). COVID-19 tested the great American experiment of federalism [25] by acting as an exogenous shock to the system that has illuminated and amplified various parts of the social world in need of redress [26]. Although states have acted as the laboratories for this natural experiment, there have been wide variations in how they have managed the pandemic, with more experimentation and very little learning, leading Kettl [27] to declare that federalism as practiced in the United States has been dangerous to our health.

According to Benton [25] and Birkland et al. [28]; intergovernmental relations (IGR) during the pandemic do not reflect a specific form of federalism but can rather be described as a “kaleidoscope” federalism under which no particular strand prevails. As stated by Benton [29]; “federalism and IGR are no longer either ‘cooperative,’ ‘creative,’ ‘competitive,’ ‘coercive,’ or ‘calculative.’ All of these descriptions and approaches, as well as many others, depict the operation and relations of the federal system, even within the same policy area” (19). IGR are kaleidoscopic in that they “can be identified by metaphors such as fragmented, push-back, nuanced, fend-for-yourself, and collaborative” [25]; 537). Inter-local and -state agreements have replaced large-scale collaborations in the absence of clear directions from the federal government [28]. Political partisanship and polarization have led to fractured forms of federalism characterized by patchwork policies across the country [30], leading ideology and partisanship to drive regional decisions [31]. During the pandemic, fragmentation, coupled with the lack of a coherent federal response, led to significant policy variations at the state level [28].

“State-Level Variations in Data Reporting and Transparency: A coordinated federal response that is critical during crises was missing in the U.S. As noted by Kapucu and Moynihan [32]; “the lack of national leadership and lack of coordinated action at the federal level caused similar inconsistency among emergency management agencies and health counterparts at state and local levels” (15). Given the polycentric nature of an American crisis response system that calls for collaborative leadership, the absence of a consistent federal strategy [33] created a system where uniformity in data was lacking. At the federal level, a number of pandemic response programs had been shut down or lacked capacity. For instance, the National Security Council (NSC) Directorate of Global Health Security and Biodefense created by the Obama administration in 2016 was disbanded in 2018 under the Trump Administration, and NSC members with expertise in global health security and emergency preparedness were reassigned or left. With respect to data collection, the faulty testing kit the CDC initially developed in February 2020 for states to conduct their own testing and get test results faster than shipping samples to the CDC led to critical delays in identifying COVID-19 cases [34].

With increasing cases and deaths through March and April 2020, there were some attempts at the federal level to improve COVID-19 data collection. For instance, in June 2020, the Department of Health and Human Services (HHS) released data reporting guidance that required the reporting of demographic factors by August 2020 (U.S. Department of Health and Human Services 2020). However, the process lacked adequate guidance or enforcement and only applied to laboratories while not requiring state or local public health departments to report COVID-19 mortality data by any specific demographic breakdowns [35,36]. House Democrats also attempted to introduce legislation on data equity, such as the Equitable Data Collection and Disclosure on COVID-19 Act bill in April 2020 [37], with a similar bill in the Senate [38], focusing on the collection and disaggregation of racial and ethnic demographic data for testing, treatment, hospitalization, and fatality results, and the creation of a Commission on Ensuring Health Equity (H.R. 6585 2020). Despite gaining support from groups such as the AMA [39], both bills died in committee. Other attempts by congressional Democrats such as the COVID-19 Racial and Ethnic Disparities Task Force Act of 2020 bill introduced on May 5, 2020, and the Ending Health Disparities During COVID-19 Act of 2020 introduced on September 11, 2020, also did not get through committees. Data collection on key COVID-19 statistics was thus left mostly to state governments; however, states have varied widely in their efforts.

With regard to the COVID-19 testing strategies that became critical to policy decisions, such as lockdowns, there were various state testing and reporting strategies. In some states, results were reported from public and private labs, while in others, there was great reluctance to report any test results at all [9]. States used different definitions for the data they collected, and there were inconsistencies even with their own definitions of metrics. For instance, some states defined their total tests as being the total number of
unique people who had been tested, while some states defined their tests as the total number of tests conducted, which included counting repeat testers multiple times [40]. Virginia and Georgia initially combined results from diagnostic and antibody tests and then changed their reporting metrics [3,9]. In terms of their own metrics, states are now revising their death counts as they have discovered data discrepancies while reviewing death certificates [40].

There have also been numerous discrepancies with regard to reporting race and ethnicity data for COVID-19 testing, cases, hospitalizations, and death counts [40,41] and with regard to the levels of disaggregation in race and ethnicity data [42]. Several states have failed to adequately capture race and ethnicity in their reporting [43]. According to the National Academy for State Health Policy [41]; as of July 2, 2021, only seven states report race and ethnicity data for testing. States have also varied considerably in terms of the categories used to report race and ethnicity data [42]. For instance, “Alaska reports cases for nine race categories (American Indian or Alaska Native, Asian, Black, Multiple, Native Hawaiian or Other Pacific Islander, Other, Unknown, White, and Under Investigation) and four ethnicity categories (Hispanic, Non-Hispanic, Unknown, and Under Investigation); in contrast, West Virginia reports cases for only four categories: Black, Other, Unknown, and White” [40; unpaginated]. Other states like Louisiana report race data for seven race categories: American Indian/Alaska Native, Asian, Black, Native Hawaiian/Pacific Islander, Other, Unknown, and White; in addition to two ethnicity categories: Hispanic/Latino or Non-Hispanic/Latino [41]. Moreover, many states have implemented different approaches for tracking race and ethnicity categories for COVID-19 cases while using different categories for other metrics, such as deaths and hospitalizations [40].

The lack of standard reporting protocols and the differences in tracking and reporting metrics have been further complicated by the lack of transparency in reporting the metrics, either intentional or otherwise. For instance, the key scientist managing Florida’s dashboard statistics for the virus was fired, leading to allegations that the state government was attempting to downplay the numbers [44]. In other states, the data were not reported clearly or were simply not reported. For instance, New York published data about deaths in long-term care (LTC) facilities but not cases; also, even though deaths were reported, there were questions raised about the state’s reporting methods and death counts [45]. Arizona did not provide any data about COVID-19 at LTC facilities other than the number of facilities affected; in nine states, no data about COVID-19 cases and deaths in LTC facilities have been available on state dashboards [40]. The state cooperation needed to ensure the protection of vulnerable populations in society [46] has been absent. Hence, the lack of data standardization protocols and the fragmented nature of COVID-19 policy responses has resulted in differing degrees of information asymmetries across states both in regard to general and race/ethnicity data transparency, generating a loss of welfare in areas where such asymmetries are amplified.

In regard to transparency, past research has found that centralized organizations tend to release more data and information than their decentralized counterparts (see Ref. [19], but to our knowledge, the impact of decentralization on data transparency in a federal system has yet to be examined. To understand the factors affecting state policy experimentation and variations—and by extension, the determinants of differential state-level information asymmetries—the following section contains a discussion of institutions and the policy responsiveness of those institutions to citizen preferences, as these factors comprise key variables in our study. In accordance with agency theory, state actors (agents) should remain responsive to the citizenry (the principal) by reducing information asymmetries through greater transparency [17].

4. Data and methods

4.1. Dependent variables

To tap state variations in disparities in collecting, tracking, and reporting metrics—that is, examining the varying degrees of information asymmetries across states—we use the data collected from the COVID Tracking Project: State Reporting Assessments that was spearheaded by the Atlantic magazine, involving many media organizations [47]. They collected data over the course of a year, ending March 7, 2021. Along with tracking data on COVID-19 cases, the COVID-19 project analyzed how data was defined, how data was made available, and how data was presented at the state level. They found several variations in each of these categories. In defining data for instance, they found that more than a year into the pandemic, definitions of basic data points, such as what even counts as a COVID-19 case, were still not standardized across states, despite the availability of standardized definitions provided by the Council of State and Territorial Epidemiologists (CSTE). Some states were combining probable and confirmed counts into streamlined total metrics. In terms of residency factors too, variations existed; some states said that their testing, case, and death counts included only people who live in the state, while counts elsewhere included anyone who was tested within the jurisdiction. In terms of data availability, a number of state variations also exist. For instance, Iowa reported percentages, not raw numbers, such as reporting that Black or African American people account for three percent of the state’s COVID-19 cases; however, no information was provided on how many people that three percent represents, nor did the state clarify whether it was three percent of all people with positive test results or rather three percent of positive test results where information about race was provided. In addition to these problems, there were other issues in data reporting, disaggregation, and transparency as noted above; states thus varied widely in their collection and reporting of data.

For assessments of the quality of state data reporting and transparency, the COVID-19 tracking project included publicly available data, along with frequent conversations with jurisdictions to understand the data they shared; this in-depth data collection was used to provide an assessment of state reporting efficacy [47]. We use their data and categorizations of state reporting efficacy to focus on two dependent variables of interest in this paper: (i) State-level Metrics (SLM); this variable measures how effectively states define and report key metrics, such as testing data, cases, hospitalizations, and deaths; and (ii) State Race and Ethnicity Data (SRED); this variable indicates the level of comprehensiveness and efficacy in state collection and reporting of race and ethnicity data [47]. The data for the two variables reflects the level of detail of each state’s reporting and the completeness and clarity of their data descriptions, thus
representing our operationalization of transparency aimed at examining differential state-level information asymmetries. The indicators for both variables are operationalized into three ordered categories: 1 = few issues exist, 2 = some issues exist, and 3 = serious issues exist [47]. To illustrate what these categories entail, an example of what they indicate for three states is provided below in Table 1.

4.2. Independent variables

4.2.1. Institutional factors: political institutions—particularly the executive and legislative branches—have been important in understanding variations in state policies [48]

Governors: As highly visible and powerful leaders, governors play an essential role in making sense of crises and communicating the outcomes of such sensemaking processes to the public [49,50]. In times of crisis, leaders aim to restore a sense of stability and normalcy to the situation by making critical decisions that involve confronting and alleviating the negative impacts associated with ever-evolving threats [51–53]. They must thus remain accountable and transparent as emergency managers, offering a calming voice by effectively communicating to the citizenry and other public organizations what has been done and what needs to be done to mitigate the effects of the crisis [54]. The COVID-19 pandemic has highlighted the need for novel, flexible, and adaptable leadership styles aimed at promoting robust governance in uncertain times [55]. Governors assumed an essential role during the pandemic due to the absence of a clear and consistent message from the federal government on how to effectively quell the spread of the virus [50,56–61], thus creating varying gubernatorial methods on how to handle issues such as racial and ethnic disparities [62].

Institutional characteristics such as gubernatorial partisanship are significant predictors of state policy implementation [63–65]. During the pandemic, Democratic governors were quicker and more likely to implement stay-at-home orders and other social distancing policies relative to their Republican counterparts [66–68]. Moreover, gubernatorial partisanship has influenced citizen responses to state policies, in addition to impacting COVID-19 case and death rates [69,70]. Public support for governors during the pandemic vacillated depending on whether they framed COVID-19 as a public health or economic issue, and party incongruences between governors and citizens, coupled with political polarization, have prevented a “rally around the flag” effect [58]. Data-driven responses focused on providing granular statistics on the number of cases, the number of deaths, and hospital capacity were used by leaders across jurisdictions; a reliance on data projections allowed U.S. governors to make policy decisions early in the pandemic “without inciting political propaganda” [71]; p. 749). However, these state leaders have not always leaned on the most pertinent statistics, as was made apparent when some governors cited statewide hospital capacity data to justify loosening restrictions without considering the number of cases and deaths or whether individual hospitals were experiencing an overload [72].

With the hypothesis that Republican governors are more likely than their Democratic counterparts to have data issues due to their tendency to enact less stringent COVID-19 regulations [66–68], a dummy variable is included for gubernatorial partisanship.\^1

Legislatures: The legislative branch has also been important in understanding policy adoptions and variations across states [48,73–75]. State responses to the virus have followed partisan and ideological lines with respect to other policies such as imposing lockdowns and restrictions; states with stronger Republican control of their governments locked down later and at lower rates than states primarily under the control of Democrats [9]. Partisanship also affected COVID-19 testing. Initially, both Republican and Democratic states had similar testing rates; however, after September 2020, Republican states fell behind their Democratic counterparts [70]. In addition to the legislative partisanship, prior research has shown that the professionalism of legislatures is an important predictor and explanation of state policies [75–78].

The literature has also examined the influence of the gender and race/ethnicity of state legislators. Some studies have found that, relative to their male counterparts, female legislators have a more liberal agenda, show a greater commitment to feminist activities, and support issues traditionally seen as important to women, such as welfare, education, and health [79]. Female legislators have also been found to be more responsive to their constituents compared to their male counterparts [80] and are likely to pay more attention to data standardization, transparency, and accountability [81]. Other studies, however, reveal mixed results [82]. In an analysis of “women-friendly” state policies, Cowell-Meyers and Langbein [83] found that an increase in women’s representation in the legislature predicted the adoption of only five of the 34 policies examined (512). Research on COVID-19 and the gender of public officials has focused mainly on the positive influence of women as leaders at the country level [84], or on how increasing the percentage of women in national legislatures reduces the chance of implementing school closures [85]. But to our knowledge, the literature has yet to examine the influence of women’s representation in state legislatures; this same point holds true for COVID-19 research on minority representation. State legislatures have a greater variety of minority representation within their ranks and districts compared to the U.S. Congress [86]. Increasing the racial and ethnic diversity of state legislatures has been shown to result in positive outcomes for minority-focused policies and the blockage of policies harmful to minority groups [82]. Wright and Merrit [87] found that a lack of minority representation in state and local governments has negatively impacted communities of color during the pandemic, but these claims have yet to be tested empirically in the COVID-19 policy literature.

To measure legislative partisanship, we use the party that controlled the state-level legislature as of March 2021 (State Partisan Composition 2021) with the hypothesis that Democratic legislatures will be less likely to have issues with data collection and reporting metrics than Republican legislatures. Divided government (states with different parties holding the legislative chambers and governorship) typically reduces the chances of enacting conflictual state policies [88]; since COVID-19 is a contentious and polarizing issue,

\^1 We attempted to include the gender of the governor, too, since states with female governors who implemented early stay-at-home regulations had fewer deaths compared to male-governed states, and research showed that female governors generally had more empathetic attitudes toward the pandemic [160]. However, given the low numbers (there were only eight female governors during this time period), this variable was not included in the models.
it was included as a control.\(^2\) Legislative professionalism\(^{76,77}\) was included with the expectation that professional legislatures would have fewer data issues. To include the potential effects of gender and race/ethnicity for the reasons discussed above, the percentage of state female legislators and the percentage of non-white state legislators\(^{89}\) were included in the analysis, with the hypothesis being that higher percentages of both would lead to fewer data issues.

**Administrative Agencies:** Administrative capacity is also important to understanding institutional capabilities when faced with implementation challenges\(^{90}\), as seen during the pandemic. And considering that the task of collecting data is within the purview of the bureaucracy, we include a measure of agency capacity similar to that used by Drolo and Keiser\(^{90}\). In their article, Drolo and Keiser\(^{90}\) measure agency capacity by combining FTE Disability Determination Service staff per capita with National Association of Disability Examiners members per capita. To capture similar variations in state administrative capacity,\(^3\) we included a measure of Full-Time Equivalent (FTE) staff per capita of state agencies focusing on health from U.S. Census data.\(^4\) This variable captures the available government workforce to administer community healthcare programs, such as the gathering of vital statistics and immunization initiatives. We hypothesize that states with larger administrative capacities will display fewer data issues.

### 4.2.2. Policy responsiveness to citizen ideology signals and needs

In addition to institutional characteristics, democratic principles lead to the expectation that policymakers (agents) will be responsive to their constituencies (the principal). Past theoretical work has discussed the importance of citizen ideology, public opinion signals, problem severity, and needs\(^{73,91–94}\).

Citizen ideology in states has received much attention in the literature due to the democratic implications associated with policy responsiveness to this variable\(^{92}\). Policymakers may respond to citizen preferences by reflecting ideological stances that can impact re-election\(^{91}\). However, recent anti-big government attitudes have made it difficult for states to fulfill social equity goals\(^{33,95}\) and address health disparities that were exacerbated by the pandemic. Since indices of liberalism-conservatism\(^{96,97}\) and ideology are more dated, and conventional right or left-wing leanings of Republican and Democratic majorities are hard to capture, particularly over the course of the pandemic given changing preferences, our research takes advantage of the protest-laden civil unrest

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\(^2\) A variable with an alternate conceptualization of partisanship similarities and differences between legislatures and governors with the following coding was also analyzed: 1 Democratic trifecta (meaning Democrats control the governorship and both chambers of the state legislature), 0 split control (one party controls the governorship while the other party controls at least one legislative chamber), \(-1\) Republican trifecta (Republicans control the governorship and both legislative chambers). In the case of Nebraska, which is nonpartisan and unicameral, a \(-1\) was assigned for 2020 as it was functionally controlled by the Republicans (Republican governor and the majority of the members of the unicameral legislature were overtly Republican). However, this variable on partisanship was not statistically significant and the separate partisanship variables for the legislature, governor, and divided government were better predictors for both dependent variables. Hence the combined partisanship variable was not used in the analysis.

\(^3\) Drolo and Keiser (2021) include the role of examiners in their variable. However, in our research, email correspondence with the National Board of Public Health Examiners (NBPH) indicated that membership data per state are often incorrect due to a lack of updated addresses. Hence, we did not include data on examiners in the variables used in our analysis.

\(^4\) This variable includes the number of state health workers providing services, excluding those in hospitals or nursing homes (U.S. Census 2017). See [https://www2.census.gov/govs/class06/ch_12.pdf](https://www2.census.gov/govs/class06/ch_12.pdf) for more discussion and details of the “health” function.
characteristic of 2020 to operationalize public opinion signals of ideological preferences by focusing on political activism and protests (see Ref. [94]) to assess the influence of citizens’ ideological preferences on COVID-19 policies.

Protests are a form of civic engagement and participation, which are often positively associated with democratic reforms [98,99] and transparency enabled by open government data, with the latter being driven by political and cultural pressures that differ across geographic areas [19]. As a form of collective action and communication, protests affect the beliefs of policymakers by supplying them with signals indicative of public opinion [94,100]. Minority protests, specifically, serve as a cue of constituency preferences that informs the votes of legislators [101]. State governments have been tasked with managing the civil unrest that has manifested itself in numerous protests and counter-protests throughout the country in 2020—e.g., those associated with Black Lives Matter (BLM). Founded in 2013, BLM’s overall message to reduce institutionalized inequities experienced renewed relevance in 2020 following the video-documented death of George Floyd at the hands of Derek Chauvin in Minneapolis, Minnesota [102,103]. Both the inequities in relation to the virus and the issues highlighted by BLM protests have reflected a public interest in major systemic changes in the country, calling attention to the distrust felt in longstanding social, economic, and health systems by communities of color [104,105].

In some cases, the disproportionate financial burden felt by communities of color during the pandemic drove engagement in BLM protests [106]. States have differed in their responses to such protests, typically by either enacting harsh penalties for protesters or by endorsing racially cognizant policies [107].

Under the assumption that state policymakers and public officials should remain responsive to the preferences of the citizenry to fulfill the goals of democracy [91–93], we use citizen activism and protests as a signal of ideological preferences to assess the effect of these preferences on the efficacy of state-level data collection and data transparency. Past research has found that “Blue Lives Matter” activism and support for law enforcement since the 2016 election has been associated with greater support from conservatives, while BLM protests are usually supported by liberals [108,109]. These variables thus provide a different type of signal of ideological preferences that reflects the unique circumstances of pandemic-related data as noted below, as compared to more traditional measures of ideology [92,110].

Although the collection, disaggregation, and dissemination of public health data is normally a mundane task, data transparency and usage during the pandemic has become highly politicized. Throughout the pandemic, states have made claims to data-driven responses to COVID-19, but such data-informed decision-making has been heavily influenced by politics [111], and states with both Republican and Democratic governors have engaged in statistical malpractice and data manipulation [112]. Decisions on whether to count deaths as COVID-related have differed across states and counties, depending on factors such as partisanship, geographic location, and the specific practices of oft-elected coroners who lack medical expertise [113]. Although all 50 state governments have created dashboards to display key metrics related to the virus, political and economic factors have influenced data presentation and decision-making [114,115]. Thus, 2020 represents a politicized environment in which to view data efficacy, rendering it reasonable to include citizen’s ideological preferences as signaled through protests as a potential factor affecting state data transparency to understand the responsiveness of public officials.

To tap policymakers’ responsiveness to citizens’ ideological preferences as expressed through their degree of activism, values for this variable were obtained from the Armed Conflict Location and Event Data Project (ACLED) [116] website. The ACLED database has been validated in past research, as it has been used to analyze protests and riots related to COVID-19 [117] and to analyze the association between economic systems, COVID-19 restrictions, and protest activity [118]. The dataset was culled by including protests and riots as the event type for the U.S. from March 2020—the beginning of the pandemic—to March 2021. Dummy variables were created to indicate each time a protest or riot was associated with Black Lives Matter, Pro-Police, Back the Blue, and Blue Lives Matter. Pro-Police, Back the Blue, and Blue Lives Matter were collapsed into one variable. The variables were then aggregated by state to obtain a raw count of protests within the relevant jurisdictions, with 2019 Census data used to convert the variables into protests per 10,000,000 state citizens [119]. Given that conservatives are more likely than liberals to support the police and “Blue Lives Matter” [108,120,121], the pro-police protests variable represents the signaling of conservative preferences, and the BLM protests variable indicates signaling of liberal ideological preferences. The expectation is that states with more BLM protests/riots per 10,000,000 people will have fewer COVID-19 data issues associated with race/ethnicity relative to states with less activism, while the opposite is expected for pro-police protests. And since conservatives have been more likely than liberals to downplay the severity of the virus [122], we predict the same for all state-level metrics as well.

4.2.3. Policy responsiveness to problem severity, needs, and social vulnerabilities

With respect to responsiveness to needs, prior research has shown that states and local governments are likely to be more responsive to problems in their jurisdictions as they understand local problems more clearly [73,74,123,124]. In the COVID-19 context, while the U.S. accounts for 4% of the world’s population, by July 2021, it had accounted for 21% of the world’s deaths [125]. The abdication of leadership by the executive branch at the federal level left states to fend for themselves [9,28] with high case rates and subsequent deaths.

To tap the extent of the problem that states faced, we use the total COVID case rates and deaths as of March 7, 2021. We hypothesize that the effects of higher numbers of cases and deaths are likely to have impacted state data collection and reporting efforts by either prompting them to do more of it (so have fewer issues), or conversely, making it more difficult for them to do so (leading to more

---

5 More traditional measures of ideology [110,157] are included in alternative analyses presented in the Appendix; however, as the analysis indicates, these measures were not statistically significant and also fail to measure the effect of citizen ideological preferences through the activism expressed in 2020.

6 See Ref. [161].
serious issues in collecting and reporting data).

Citizen needs are also reflected in the concept of social vulnerability. Social vulnerability, a multidimensional construct captured in socio-economic/human dimensions, pre-disaster inequities, and physical dimensions/exposure, impacts the capacity of households and communities to withstand disasters and their impacts, particularly for the most marginalized segments of society [126–132]. Similar to other disasters, the COVID-19 pandemic has disproportionately impacted certain populations [87,133,134]. For instance, California reported 79.6% of cases to be individuals of a minority community in July 2021 [135]. In New Hampshire, which is predominantly White (93.1%), 40.3% of all COVID-19 cases were from a minority community as of July 2021 [136–138]. As of July 13, 2021, the Centers for Disease Control (CDC) reported that minority communities comprised 50.9% of the entire COVID-19 cases in the country [139]. Essential workers and populations in higher-risk environments such as nursing homes and prisons have also been adversely affected [140,141]. These vulnerable communities matter in understanding state policy responsiveness and provision of information in tracking the spread of COVID through data collection and disaggregation.

To measure the needs of vulnerable citizens, we use data created for a COVID-19 Community Vulnerability Index, which includes a number of sub-indices [142]. The sub-indices we utilize are Socio-economic Status (which includes data estimates on persons living below poverty, unemployed civilians over the age of 16, state per capita income, persons with no high school diploma above the age of 25, and the percent of uninsured populations); Minority Status and Language (includes an estimate of all persons except white, non-Hispanic and persons 5+ that speak English ‘less than well’); Epidemiological Factors (includes data on high risk populations such as elderly adults and individuals with underlying conditions including respiratory conditions, heart conditions, obesity, diabetes, and conditions related to immunodeficiency); and High-Risk Environments (includes indicators for sub-groups of populations whose living or work environments puts them at high risk of contracting the virus, such as nursing home and assisted living residents, prison populations, and workers in high-risk industries—e.g., meat and poultry processing, manufacturing, and passenger ground transportation). The variables for each of these indices were represented by percentiles, which were then aggregated to form the index. Equal weight is given to each variable within each index; the composite measure for each index is measured on a 0–20 scale (0 = least vulnerable, 1 = most vulnerable) (see Ref. [142] for more details).7 If states are being responsive to the needs of vulnerable populations, then the impact would be negative—states would be better at data collecting and reporting. However, for each of these variables, it could also be the case that states did not respond effectively, in which case there will be more issues with data collection.

Since our dependent variables are measured at the ordinal level with three categories (1 = few issues exist, 2 = some issues exist, 3 = serious issues exist), we fitted an ordinal logistic regression or the proportional odds model, which is used with variables with two or more ordered categories [143]. All models were estimated using STATA statistical software version 15 (StatCorp L.P., College Station, TX).

5. Results

Table 2 presents descriptive statistics for our dependent and independent variables.

Table 3 presents the results for the first dependent variable, the extent of COVID-19 state-level metrics data reporting.8

The model fit is indicated by the chi-square, which is statistically significant, and the pseudo r-square of 0.474.9 With respect to institutional factors, the results support the hypothesis that Democratic controlled legislatures have fewer issues in data efficacy and reporting; the legislative partisanship variable is statistically significant. The negative coefficient for this variable indicates that for a Democratic-controlled legislature, the ordered log-odds of having issues with reporting data decrease by 7.028 while the other variables in the model are held constant. The percentage of female legislators also has a significant effect, but this variable increases the extent of data reporting issues. Variables measuring gubernatorial partisanship and divided government were not statistically significant in this model10.

Regarding policy responsiveness to citizen ideological signals, while the BLM variable was not statistically significant, the coefficient for pro-police protests was, supporting the hypothesis that states with higher numbers of pro-police protests were likely to have more issues in reporting data with greater information asymmetries. In other words, a conservative ideological signal predicts an increase or more problems in data transparency. Other statistically significant variables are those measuring the needs and vulnerability of citizens. States with more COVID-19 cases had more issues in reporting data metrics. Similarly, the statistically significant and positive coefficient for the epidemiological factors and minority status and language variables indicates that increases in higher-risk medical populations and minority populations are likely to increase problems in reporting and assessing metrics. However, the vulnerability index for socio-economic status was statistically significant and negative, indicating that a one-unit increase in a state’s socio-economic vulnerability index decreased the odds of having some or serious issues. This indicates that states responded to the needs of lower-income populations by improving their efficacy in reporting and reducing information asymmetries.

7 To correct for non-normality, two of the factors, Minority Status and Language and Epidemiological factors, were transformed (multiplied by 100) to bring them closer to normal distributions.

8 Legislative professionalism was left out of both models because of its statistically significant correlation with legislative partisanship. We found that when the legislative professionalism variable was included in the analysis in lieu of the partisanship variables, it was not statistically significant, confirming our theoretical expectations about the importance of partisanship as a predictor. The percentage of minority legislators was not significant in both models, so it was removed from the final results.

9 For this model, since there were very few states in the category “serious issues”, we combined states classified as having some or serious issues into one category.

10 The state agency capacity variable was included in the initial analysis of this model. However, this model did not converge correctly with the inclusion of this variable due to the nature of the dependent variable, which has fewer observations in one of the categories. Hence, it was dropped from the final analysis for this model.
Table 4 presents the results of the analysis for the second dependent variable, state collection and reporting on race and ethnicity data.

The model chi-square is statistically significant, and the pseudo r-square is 0.438. The findings indicate that partisanship is important. The hypotheses with respect to legislative partisanship and divided government are supported; the coefficients are statistically significant and negative. Democrat-controlled legislatures and state governments under split control are likely to lower the odds of having some or more serious issues with reporting race and ethnicity data with fewer information asymmetries in this area. The gubernatorial partisanship variable was significant at a .05 level; however, the hypothesized negative effect was not supported as the results indicate that Democrat governors may have increased the odds of having more data issues in reporting race and ethnicity data.

With respect to other institutions, the hypothesis on state administrative capacity, measured as state health agency staff per capita, is supported (statistical significance at the 0.10 level). As expected, higher state administrative capacity reduces the probability of having more issues in collecting and reporting data.

With respect to policy responsiveness to problems and needs of citizens, an increase in the number of COVID-deaths increased the odds of having more serious issues in collecting and reporting race and ethnicity data, while an increase in the COVID-19 case rates lowered the odds of having issues, indicating better data reporting for race and ethnicity data. None of the citizen ideology signal variables were statistically significant, but vulnerability levels in terms of minority status and language and epidemiological factors...
were statistically significant and indicate that an increase in the number of minorities and medically higher risk populations increase
the odds of a state having some or serious issues in data collection and reporting assessments, confirming the arguments that minority
populations are more likely to live in areas with less testing [144]. Similar to the model for state-level metrics, the socio-economic
status variable was statistically significant with a negative coefficient, indicating fewer issues in collecting and reporting race and
ethnicity data.

6. Discussion

Across both models, our hypotheses with regard to partisanship were supported. These findings confirm our theoretical arguments
that the efficacy of data collection and reporting processes, particularly during the pandemic, was influenced to a larger extent by
political factors such as partisanship, given the rhetoric used by many Republican governors and legislators to downplay the impact
of the virus. Moreover, the stakes were high for both Republicans and Democrats in collecting and reporting data, as case counts and
deaths were used to make critical economic and political decisions on lockdowns and openings; given that 2020 was an election year,
the stakes were even higher for both political parties to show that they were effectively dealing with the pandemic. Unlike other public
health data, COVID-19 health data needed to be reported more frequently, were in a different format (for instance, daily counts,
moving averages, and dashboards with geospatial data were needed), and were scrutinized more closely by citizens to monitor the
collection situation and assess risks.

However, it seems that legislative partisanship rather than gubernatorial partisanship had a greater influence on data transparency
and reducing information asymmetries. Given the active and high-profile media role that governors played during the pandemic with
the signing of numerous executive orders [61] and press conferences [50], it may seem surprising that governors were not as influential
as other factors in this study. For state race and ethnicity data reporting, the results indicate that when governors were important,
Democratic governors increased the odds of having greater issues in data reporting and disaggregation. This finding is supported by
reports that the push to collect race and ethnicity data even before the pandemic was often initiated by state legislators while
sometimes being rejected by Democratic Governors; for instance, a bill passed by the New York state legislature in 2019 to collect
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reports that the push to collect race and ethnicity data even before the pandemic was often initiated by state legislators while
sometimes being rejected by Democratic Governors; for instance, a bill passed by the New York state legislature in 2019 to collect
was vetoed by the Democratic Governor [35, 145]. The analysis in this study also in
stantly significant associations between state institutional characteristics, such as divided government and state agency
capacity, and data collection and transparency practices. This finding supports the contention that governors, while often the public
face of the crisis, quickly slipped back into relatively familiar, politically proven policy streams and policy decisions that had been
produced over the years [3]. As noted above, it was the legislatures in some states that pushed for better data collection efforts; for
instance, the Maryland Legislative Black Caucus pushed the governor to collect and release data related to race and ethnicity to un-
derstand the impact of the virus [146]. Similarly, in May 2020, the Massachusetts state legislature enacted legislation on improving
COVID-19 data collection and addressing disparities to increase data transparency and equity [147].

In examining policy responsiveness to citizen preferences—i.e., the accountability of the agent to the principal—it appears that
states are more responsive to conservative signals with regard to not reporting data effectively, which may be indicative of state at-
ttempts to downplay the pandemic by not being more comprehensive and transparent in their data collection efforts. In responding to

### Table 4
Ordered logistic regression analysis of state race and ethnicity data.

| Variables Hypothesized Effects | Coef. | Std. Error | Odds Ratio | P>|z|
|--------------------------------|-------|------------|------------|------|
| Institutional Factors         |       |            |            |      |
| Governor Party                | +/−   | 2.807**    | 1.431      | 16.555 | 0.050 |
| Per. of Female Legislators    | +/−   | −0.069     | 0.072      | 0.934  | 0.339 |
| Divided Government            | +/−   | −5.217***  | 1.952      | 0.005  | 0.008 |
| Partisanship Legislation      | −     | −8.812***  | 3.459      | 0.000  | 0.011 |
| State Agency Health Capacity  | +     | −0.001*    | 0.000      | 0.999  | 0.098 |
| Policy Responsiveness: Problem Severity |       |            |            |      |
| COVID Cases                   | +/−   | −0.015***  | 0.007      | 0.986  | 0.006 |
| COVID Deaths                  | +/−   | 0.097**    | 0.043      | 1.102  | 0.024 |
| Citizen Ideology Signals      |       |            |            |      |
| BLMper10,000,000              | −     | 0.003      | 0.005      | 1.003  | 0.576 |
| ProPolicer10,000,000          | +     | 0.045      | 0.041      | 1.046  | 0.275 |
| Social Vulnerabilities        |       |            |            |      |
| Socio-economic Status         | +/−   | −6.612**   | 3.155      | 0.001  | 0.036 |
| Minority Status & Language    | +/−   | 0.088**    | 0.044      | 1.092  | 0.044 |
| Epidemiological Factors       | +/−   | 0.058**    | 0.029      | 1.060  | 0.046 |
| High-Risk Environments        | +/−   | −0.353     | 2.287      | 0.703  | 0.877 |

/cut1 | −7.673 | 4.160 |
cut2 | 1.766 | 3.371 |
LR chi2 (13) = 33.33 Number of obs = 50 
Prob > chi2 = 0.0015 Log likelihood = −21.357343 Note: *p < 0.1; **p < 0.05; ***p < 0.01
problem severity and needs, increasing numbers of cases did increase the likelihood of better reporting of race and ethnicity data; however, increases in COVID-19 case rates did not improve overall data collection and reporting, indicating that states may have responded to the higher number of cases by downplaying the numbers presumably to either open sooner or for political expediency to look like they were handling the situation well. Similarly, the number of COVID-19-related deaths was associated with more issues in reporting race and ethnicity data. This finding may reflect reports that death counts are still being revised and corrected in some states, such as Oklahoma, which is revising its dashboard on death counts [40]. Increases in minority and medically higher risk populations also increase the likelihood of having more issues with data metrics and disaggregation, indicating that states did not do a good job of collecting and reporting data on these populations; this supports reporting on potential undercounting of medically vulnerable populations in nursing homes (see, e.g., Ref. [141]). However, it seems that increases in populations with high socio-economic vulnerability do spur better overall collection and reporting of state metrics as well as of race and ethnicity data.

7. Conclusion

During much of the pandemic, the U.S. response to COVID-19 has been characterized by confusion, intergovernmental friction, a lack of federal-level leadership, contradictory messages, and fragmented policy responses [9,25,28]. The responsibility for dealing with the pandemic and its effects were left to state governments with regard to critical decisions on whether and to what extent to lockdown, how to acquire protective equipment, and how to collect and report data. State policies varied widely in response to federal devolution. The lack of testing and state variations in data collection and reporting metrics complicated understandings of the seriousness of the problem and the speed of the spread during the pandemic. Through the lens of agency theory, this paper focuses on understanding these state variations in pandemic-related data collection and reporting and data disaggregation by race and ethnicity. As noted by the American Medical Association (AMA), demographic data is a key tool to fight inequities in COVID-19 pandemic planning and to address health disparities [148]. Data specificity is needed not only to understand the impact and reach of the pandemic but also to inform appropriate response and planning [149]. Without adequate race and ethnicity data associated with COVID-19 testing, hospitalizations, morbidities, and mortalities, physicians and hospitals will not be able to properly care for their patients [39].

To address this issue, we analyzed predictors of variations across U.S. state policies with regard to collecting and reporting metrics and disaggregating data by race and ethnicity using the theoretical understandings and past research on agency theory, transparency, state institutions, and policy responsiveness. Our findings indicate that state-level information asymmetries with regard to data collection and reporting processes were reduced with Democratic control of state legislatures; however, citizen activism reflecting more conservative policy support, higher numbers of medically vulnerable and minority populations, and female state legislators are associated with more issues in data collection and reporting. Improvements in state-level reporting and disaggregation of race and ethnicity data are seen in Democratic-controlled state legislatures and states with higher COVID case rates, while there is less policy responsiveness with data reporting and disaggregation to higher levels of minority and medically at-risk populations.

Although these factors are important, we acknowledge that the approach and data used in this study too have their limitations. Given the paucity of data, our analysis relies in part on data collected by non-governmental and media organizations. Though it could be argued that these measurements lack validity, past research has used portions of the Atlantic’s COVID Tracking Project as covariates in statistical models (see, e.g. Refs. [150–152], demonstrating the project’s utility in academic research. The nature of our dependent variables, which calls for a logistic regression model estimation, also has limitations that occur with smaller sample sizes. We rely on a cross-sectional analysis; studying the issue of equity measures over time could provide different insights. However, panel data on the variables for each of the 50 states were not possible to obtain.

Despite these limitations, our research sheds light on an issue that is important in understanding the actions of governments in addressing health disparities and equity through effective data transparency practices. While there has been research on the role of political actors and the protective actions or otherwise that states have taken to address the pandemic [56,66,67], little attention has been paid to the issue of data equity in terms of data collection and reporting as a way to reduce information asymmetries and improve the accountability of agents (public officials) to the principal (the citizenry). This study helps to address that area. Moreover, our emphasis on data transparency and equity is critical in examining pandemic responses, particularly since states used the data on cases, test positivity rates, and hospitalizations when needed to justify restrictions, lockdowns, and other mitigation and adaptation policies. While data surveillance and collection can be intrusive, collecting key data, particularly for vulnerable populations, and communicating risk based on that data was successful in other countries, such as South Korea, leading to increased legitimacy for government actions and a ‘trust surplus’ with increased levels of trust in government; this led to improved health outcomes with lower case rates, hospitalizations, and death rates [153].

The policy implications from our study suggest that there is a growing and critical need for standardized data collection protocols, collection of comprehensive race and ethnicity surveillance data, and data repositories. The salience of such implications extends beyond the United States, as other countries have experienced racial and ethnic COVID-related disparities [154], and methods for counting cases and deaths have been country-specific, thus lacking cross-national comparability and global uniformity [155]. Indeed, an interrogation of official death tolls via an examination of excess deaths across countries displays an undercount of COVID-19 mortality rates [156]. Moreover, other federalist systems may have the same information asymmetries and data transparency issues as those in the United States, where the devolution of authority and the absence of a consistent federal message have engendered...
deleterious health consequences for state populations [9, 27].

What specific steps can policy-makers and practitioners take to improve these processes? We advance four suggestions here:

First, policy-makers, public health officials, and emergency managers within the U.S. and globally should be aware of the essential role they play in appropriately collecting and disseminating public health data and the importance of mitigating health disparities to increase social equity outcomes for marginalized and vulnerable communities. Second, state and local governments and organizations, including schools and universities, need to be transparent about health data and maintain and disseminate public health data via mechanisms such as public health dashboards (that include clear definitions of the data and other information) and through other avenues to be easily accessible. Data definitions need to be accessible from a state’s data pages and presented in easily and intuitively accessible locations [47]. Third, data dissemination of public health data during pandemics and other disasters needs to be high-quality, trustworthy, reliable, timely, frequent, and accurately reflect changing statistics. Finally, data needs to be disaggregated by various factors such as ethnicity, race, age, geographic area, and other socioeconomic variables to understand the impacts of pandemics and disasters while discerning how to appropriately protect vulnerable populations.

The rise of new variants and continuing waves of increasing infections in different areas of the world make it likely that the COVID-19 pandemic will continue to evolve over time. Lessons learned from this pandemic in terms of data collection, transparency, and dissemination will be critical in reducing disaster risks and improving resilience to other pandemics and disasters in the future.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

We also ran analyses using more traditional measures of citizen ideology. Since the most recent Berry et al. measure of citizen ideology is from 2016 in the file on Fording’s website [157], we used instead a measure of citizen conservative and liberal identification taken from a Gallup US poll conducted in 2018 [110]. The variables from this data include the percentage of respondents identifying as conservative, the percentage of respondents identifying as liberal, and conservative advantage (measuring the percentage point difference between the conservative and liberal Identification percentages). While the variable ‘conservative advantage’ was statistically significant in the State Level Metrics model at the 10% level, it lowered the predictive power of the model; specifically, the explanatory power of the model was nearly halved when including the variable conservative advantage in lieu of the signaling of citizen ideology via the indicators measuring levels of political protest (both pro-police and pro-BLM). The results of that model are presented in Table A1 below. In further analyses, the variables measuring the percentage of respondents identifying as conservative and liberal in each state were not supported in any of the models. Similarly, analyses utilizing Berry et al.’s operationalization of citizen ideology returned statistically insignificant results, high multicollinearity, and a substantially weaker model.

Table A.1

Ordered Logistic Regression Analysis of State-Level Metrics

| Variables                  | Hypothesized Effects | Coef.   | Std. Error | Odds Ratio | P>|z| |
|----------------------------|----------------------|---------|------------|------------|------|
| **Institutional Factors**  |                      |         |            |            |      |
| Governor Party             | –                    | –0.840  | 1.293      | 0.432      | 0.516|
| Per. of Female Legislators | +/-                  | 0.231** | 0.104      | 1.260      | 0.026|
| Divided Government         | +/-                  | –0.356  | 1.245      | 0.700      | 0.775|
| Partisanship Legislature   | –                    | –1.200  | 1.788      | 0.301      | 0.502|
| **Policy Responsiveness: Problem Severity** | | | | | |
| COVID Cases                | +/-                  | 0.007   | 0.005      | 1.007      | 0.124|
| COVID Deaths               | +/-                  | –0.023  | 0.082      | 0.977      | 0.421|
| **State Ideology**         |                      |         |            |            |      |
| Conservative Advantage     | –                    | 0.143*  | 0.082      | 1.154      | 0.082|
| **Social Vulnerabilities** |                      |         |            |            |      |
| Socio-economic Status      | +/-                  | –4.255  | 2.866      | 0.014      | 0.138|
| Minority Status & Language | +/-                  | 0.001   | 0.027      | 1.001      | 0.966|
| Epidemiological Factors    | +/-                  | 0.056** | 0.025      | 1.057      | 0.027|
| High-Risk Environments     | +/-                  | –6.226**| 2.789      | 0.002      | 0.026|
| /cut1                      |                     | 5.987   | 4.166      |            |      |

(continued on next page)

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11 Also noted in Ref. [162].
Table A.1

| Variables | Hypothesized Effects | Coef. | Std. Error | Odds Ratio | P>|z|< |
|-----------|----------------------|-------|------------|------------|--------|
| LR ch2(12) = 15.38 |                       |       |            |            |        |
| Prob > ch2 = 0.1659 |                       |       |            |            |        |
| Log likelihood = -22.855 |                       |       |            |            |        |
| Pseudo R2 = 0.2517 |                       |       |            |            |        |

Number of obs = 50
Note: *p < 0.1; **p < 0.05; ***p < 0.01

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