

NBER WORKING PAPER SERIES

BLACK LIVES MATTER PROTESTS, SOCIAL DISTANCING, AND COVID-19

Dhaval M. Dave  
Andrew I. Friedson  
Kyutaro Matsuzawa  
Joseph J. Sabia  
Samuel Safford

Working Paper 27408  
<http://www.nber.org/papers/w27408>

NATIONAL BUREAU OF ECONOMIC RESEARCH  
1050 Massachusetts Avenue  
Cambridge, MA 02138  
June 2020

Sabia acknowledges research support from the Center for Health Economics & Policy Studies (CHEPS) at San Diego State University, including grant support received from the Charles Koch Foundation and the Troesh Family Foundation. We thank Kasey Buckles for helpful advice on a previous version of the paper, as well as Drew McNichols, Alicia Marquez, Cameron Milani, James Curry, Calvin Bryan, Erich Kevari, Connor Redpath, and Melinda Mueller for outstanding research assistance. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

NBER working papers are circulated for discussion and comment purposes. They have not been peer-reviewed or been subject to the review by the NBER Board of Directors that accompanies official NBER publications.

© 2020 by Dhaval M. Dave, Andrew I. Friedson, Kyutaro Matsuzawa, Joseph J. Sabia, and Samuel Safford. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

Black Lives Matter Protests, Social Distancing, and COVID-19

Dhaval M. Dave, Andrew I. Friedson, Kyutaro Matsuzawa, Joseph J. Sabia, and Samuel Safford  
NBER Working Paper No. 27408

June 2020

JEL No. H75

### ABSTRACT

Sparked by the killing of George Floyd in police custody, the 2020 Black Lives Matter protests have brought a new wave of attention to the issue of inequality within criminal justice. However, many public health officials have warned that mass protests could lead to a reduction in social distancing behavior, spurring a resurgence of COVID-19. This study uses newly collected data on protests in 315 of the largest U.S. cities to estimate the impacts of mass protests on social distancing and COVID-19 case growth. Event-study analyses provide strong evidence that net stay-at-home behavior increased following protest onset, consistent with the hypothesis that non-protesters' behavior was substantially affected by urban protests. This effect was not fully explained by the imposition of city curfews. Estimated effects were generally larger for persistent protests and those accompanied by media reports of violence. Furthermore, we find no evidence that urban protests reignited COVID-19 case growth during the more than three weeks following protest onset. We conclude that predictions of broad negative public health consequences of Black Lives Matter protests were far too narrowly conceived.

Dhaval M. Dave  
Bentley University  
Department of Economics  
175 Forest Street, AAC 195  
Waltham, MA 02452-4705  
and IZA  
and also NBER  
ddave@bentley.edu

Joseph J. Sabia  
San Diego State University  
Department of Economics  
Center for Health Economics  
& Policy Studies  
5500 Campanile Drive  
San Diego, CA 92182  
and IZA & ESSPRI  
jsabia@sdsu.edu

Andrew I. Friedson  
Department of Economics  
University of Colorado Denver  
Lawrence Street Center 460T  
Campus Box 181  
P.O. Box 173364  
Denver, CO 80217-3364  
andrew.friedson@ucdenver.edu

Samuel Safford  
Center for Health Economics  
and Policy Studies  
San Diego State University  
San Diego, CA  
safford.samuel@gmail.com

Kyutaro Matsuzawa  
Center for Health Economics  
and Policy Studies  
San Diego State University  
San Diego, CA  
qmatsuzawa@gmail.com

## *1. Introduction*

Throughout the majority of 2020 the United States has battled a pandemic of the disease COVID-19. The spread of the disease in the U.S. was rapid and deadly: COVID-19 was confirmed to have infected over 1.7 million Americans and killed over 93.4 thousand Americans as of May 25, 2020 (Johns Hopkins University 2020). May 25, 2020 also saw one additional fatality of historical note: George Floyd, a 46-year-old black man, was killed by a member of the Minneapolis Police Department when an officer used his knee to pin Floyd's neck to the ground for over eight minutes (Hill et al. 2020). The death, which resulted in the officer being charged with murder, touched off a series of protests in cities around the United States, with protesters demanding policing reform (Taylor 2020).

These two national movements: the fight to contain COVID-19, and the Black Lives Matter protests for reform in law enforcement and for greater social equality, have espoused some tactics which appear to be in direct opposition to one another. Specifically, one of the main tactics for controlling the spread of COVID-19 is social distancing: avoiding large public gatherings, and maintaining at least 6 feet of distance between individuals (Australian Government Department of Health. 2020; Public Health England. 2020; Public Health Agency of Canada. 2020; White House 2020). At the same time, protests, designed to galvanize public action for social justice, are by definition large public gatherings in which it is difficult to avoid close contact with others. This mismatch of tactics has drawn many in the public health community to speculate that the protest movement could lead to a surge in COVID-19 cases (Bacon 2020; Goldberg 2020; Harmon and Rojas 2020). On the other hand, other public health experts have made the argument that the goals of the protests may be worth the costs (Simon 2020).

However, whether the Black Lives Matter protests actually caused an increase in the spread of COVID-19 is an open question. While the protests themselves were large gatherings that do not match well with social distancing guidelines, the protesting population is not the only one that may have a behavioral response. For example, other individuals who did not wish to participate in the protests, perhaps due to fear of violence from police clashes or general unrest, may have chosen to avoid public spaces while protests were underway. This could have an offsetting effect, increasing social distancing behavior in other parts of the population. The net effect, on both social distancing and on the spread of COVID-19 is thus an empirical question, and the focus of this study.

Using anonymous cell phone tracking data from SafeGraph, Inc., as well as data on the local prevalence of COVID-19 from the Centers for Disease Control and Prevention, we demonstrate that cities which had protests saw an *increase* in social distancing behavior for the overall population relative to cities that did not. In addition, we find no evidence that net COVID-19 case growth differentially rose following the onset of Black Lives Matter protests, and even modest evidence of a small longer-run case growth decline. These results make an important contribution not only to the current discussion around policies for controlling the spread of disease, but also to the understanding of human behavior of the general population during periods of civil unrest.

## ***2. Background***

### *2.1 COVID-19 and Social Distancing*

The main vector for transmitting COVID-19 is believed to be respiratory droplets, which are emitted during respiratory expulsion such as breathing, speaking, coughing or sneezing

(Centers for Disease Control and Prevention 2020a, Fineberg 2020). The disease has been able to circulate rapidly in part due to its ability to spread from asymptomatic carriers, allowing individuals to infect others without knowing that they have done so or even that they themselves are infected (Bai et al. 2020; Pan et al. 2020; Rothe et al. 2020).

To combat the pandemic, governments have taken on two types of strategies. The first is a set of public health recommendations for social behavior within the population. Specifically, government health agencies have recommended frequent hand washing, mask-wearing in public and social distancing – avoiding public spaces and when in public spaces maintaining distance (usually at least 6 feet) between oneself and others (World Health Organization 2020; Centers for Disease Control 2020b). The second set of policies have involved public encouragement and enforcement of social distancing by shutting down public spaces, such as school closures, public gathering bans, and blanket shelter-in-place orders. These policies have been the subject of a growing literature that has shown meaningful increases in distancing behavior and meaningful decreases in disease infection growth rates following the enactment of shelter-in-place orders, suggesting that the strategy of social distancing (and its associated enforcement policies) have been largely successful at slowing the spread of the disease (Courtemanche et al. 2020a,b; Dave et al. 2020a,b,c; Friedson et al. 2020).

## *2.2 Features of the 2020 Black Lives Matter Protests*

On May 25, 2020 George Floyd was arrested for trying to use a counterfeit twenty-dollar bill to purchase cigarettes. During the course of the arrest, one of the officers involved, Derek Chauvin, who is white, restrained George Floyd by pinning him to the ground by his neck with the officer's knee. Despite complaining that he was unable to breathe, Derek Chauvin continued

to restrain George Floyd in that position for 8 minutes and 46 seconds, during which he became unresponsive and stopped breathing (Hill et al. 2020; Furber et al. 2020; State of Minnesota 2020).

News of the killing sparked immediate protest of policing behavior, with the first protest taking place in Minneapolis on the next day, May 26, 2020.<sup>1</sup> The death of George Floyd also sparked widespread protests in large cities nationwide. Figure 1 shows both the gradual diffusion of the protests, with 281 cities (documented to have a municipal population of at least 100,000) seeing protests by June 16, 2020. The vast majority of these cities saw protests lasting more than 3 days (72 percent) and about one-third were attended by at least 1,000 people, according to media reports.

While many protests remained continuously peaceful, some included violence. There were several high-profile instances of looting in cities such as Chicago, Minneapolis and Los Angeles (Khazan 2020, Peterson 2020), as well a number of instances of police use of force against protesters, including pepper spray, tear gas, and rubber bullets (Kim 2020). Some of the police violence was in the course of enforcing citywide curfews which were enacted in some cities in response to the large protests.

### *2.3 Protests and Transmission Behaviors*

Large scale protests could impact social distancing and disease transmission through two key populations, those who attend the protests and those who do not. Any impact on the overall

---

<sup>1</sup> The recent Black Lives Matter protests are not the first time that the killing of an individual has led to large scale protests with regards to issues of unequal treatment by law enforcement on the basis of race. The Black Lives Matter movement traces back to 2013 (Black Lives Matter 2020), but the larger issue of racial justice within law enforcement in the United States is substantially older.

population rates of distancing behavior and contagion will be based on the relative effects of the protests on the behavior of these populations as well as their sizes, and demographics.

### *2.3.1 Protest Attendees and Transmission Behaviors*

A protest is an activity that is difficult to socially distance. Attendees of the protests, be they protesters, or police tend to congregate around points of interest (such as a seat of government) in close proximity. While attendees can utilize some compensatory behaviors to prevent spreading infection, such as wearing masks, maintaining distance from each other, and staying home if they feel ill, it is difficult at such an event to completely avoid human contact. Many activities that are common at protests, such as chanting or shouting can exacerbate the spread of respiratory droplets (Wei and Li 2016). Additionally, many forms of crowd dispersal used by law enforcement to break up protests such as pepper spray or tear gas illicit coughing, which increases the likelihood that an infected individual will spread disease (Xi et al. 2009; Rothenberg et al. 2016; Wei and Li 2016). In sum, we hypothesize that protests are activities that would increase disease transmission, albeit perhaps in a dampened fashion if countermeasures such as masks are used pervasively.

### *2.3.2 Avoiders and Transmission Behaviors*

The population who does not attend the large protests could have their social distancing behavior altered by the presence of the protests locally. If the protests increase the perceived cost of activities outside of the home, individuals would be more likely to avoid those activities and thus remain distanced from others. This could take the form of additional time costs from traffic congestion or from routing around streets closed off due to protests.

There are other reasons why individuals could perceive leaving home to be costlier when protests are present in the same city. If the protests are seen as dangerous (due to the protesters or the police being potentially violent), then individuals may not leave home due to the additional risk to their person or property. This would be consistent with previous literature showing a link between crime and reduced outdoor physical activity, where individuals avoid going outside due to additional perceived risk (Bennet et al. 2007; Stafford et al. 2007; Roman and Chalfin 2008; Janke, Propper and Shields 2016; Yu and Lippert 2016; Stolzenberg, D’Alessio and Flexon 2019). Also, if businesses are closed, either due to destruction from looting or as a preventative measure to avoid looting, this could lower the options for out of the home activities for non-attendees, increasing the likelihood that they would stay home. Finally, non-attendees may perceive a higher risk of COVID-19 infection due to the protests and choose to stay home.

### ***3. Data***

#### ***3.1 Urban Protests***

Our data on protests are collected from May 25, 2020, the day George Floyd was killed, through June 20, 2020 from 315 U.S. cities with municipal populations estimated at 100,000 or more in 2019 (U.S. Census Bureau 2019). Searches for protests were carried out by the Center for Health Economics & Policy Studies (CHEPS) at San Diego State University using internet searches for local and national news articles, reports from local police departments, and communications from mayors’ and governors’ offices. Of the 315 largest U.S. cities under study, we document that 281 cities saw a protest while 34 did not. Figure 1 documents the geographic dispersion of these protests over time, beginning on May 26, the first day following

George Floyd's death. The first large U.S. cities to experience protests were Minneapolis, Minnesota (May 26), the city where George Floyd was killed, followed by Memphis, Tennessee (May 27), and Los Angeles, California (May 27). On May 28, 14 additional cities held protests, followed by 49 additional cities on May 29, 88 cities on May 30, 49 on May 31, and 78 in the month of June.

Appendix Figure 1 shows the geographic distribution of the "control" cities without protests (in black) as compared to the treatment cities (in red). Included among geographically diverse large cities without a Black Lives Matter protest were Aurora, Colorado, Hialeah, Florida, and Irving, Texas.

In Appendix Figure 2, we explore heterogeneity across protests by showing protests which were accompanied by mainstream media reports of violence (which may include looting or arrests) (blue) as compared to those that were consistently described as only peaceful (yellow). Of the 281 cities with protests, 134 cities (47.7 percent) had a protest that were accompanied by reports of violence.

We also explore differences in protests in how persistent they were. Appendix Figure 3 compares large cities that had protests continue for three or more days (blue) as compared to cities that held protests on only one or two days (yellow). We find that 71.9 percent of treatment cities (202 of 281 cities) held protests for 3 or more days.

In Appendix Figure 4, we show which cities included large protests, with media reports of crowd sizes exceeding over 1,000 individuals. Such protests could increase the risk of COVID-19 spread via the largest reductions in social distancing. These larger protests are depicted in blue and comprise 36.3 percent of all protest cities.

Finally, in Appendix Figure 5, we map our 281 “protest cities” into their primary 202 counties (black) and 42 secondary counties (grey) using the crosswalk created by Simplemaps, which compiles up-to-date geographic information from the U.S. Geological Survey and U.S. Census Bureau.<sup>2</sup> We do this for two reasons. First, our primary analyses of social distancing and COVID-19 case growth will be at the county-level given data availability of both of these outcomes. Second, using the county as our geographic unit of observation will allow us to capture potentially important spillover effects from local protesters who (i) travel beyond city limits to attend the events and (ii) perhaps travel back home where the coronavirus may be spread. Supplemental analysis will widen this ring to include secondary counties associated with primary counties, as well as include other border counties of the primary county where the protest took place.

### *3.2 Social Distancing*

Our data on social distancing are drawn from Safe Graph, Inc., which provides an anonymized population movement dataset of nearly 45 million smartphone devices aggregated to the census block, county, and state levels.<sup>3</sup> These data have been used by the Centers for Disease Control and Prevention (Lasry et al. 2020) and by COVID-19 scholars examining social distancing in the United States (Andersen et al. 2020; Dave et al. 2020a,b,c; Friedson et al. 2020; Abouk and Heydari 2020; Gupta et al. 2020).

Our social distancing analysis period spans the 30 days from May 15, 2020 through June 13, 2020, which envelopes the date of George Floyd’s death (May 25) and the outbreak of urban

---

<sup>2</sup> The crosswalk is available at: <https://simplemaps.com/data/us-cities>

<sup>3</sup> SafeGraph data, and a detailed description of these data, are available at: <https://www.safegraph.com/dashboard/covid19-shelter-in-place>

protests (May 26). Our analysis focuses on 208 primary counties which map to the 315 cities with a municipal population of 100,000. The average population of these counties is 779,565. In supplemental analyses, we add 42 “secondary” counties, to which large cities extended, to the treatment group. Moreover, we also consider augmenting the treatment group to include 739 border counties outside of the city limits to ensure that our results do not fail to capture important spillovers of protests.

From the SafeGraph data, we generate three measures of social distancing. The first measure, *Stay-at-Home Full-Time*, captures the percent of the state population who remain at home for the entire day. A person’s home is defined as a 153-meter by 153-meter area that receives the most frequent GPS pings during the overnight hours of 6pm to 7am. To construct this measure, each smartphone is assigned a “home” (or 153m by 153m square) based on a common nighttime location. We estimate that in our sample, 35.6 percent of respondents remained at home full-time.

We also measure two variables that capture social distancing behavior at the intensive margin: *Median Hours at Home* and *Median Percent Time Spent at Home*. On average, county-level respondents in our urban sample remained at home for a median of 12.5 hours per day and for 89.6 percent of the time.<sup>4</sup>

Panels (a) through (c) of Appendix Figure 6 shows trends in our three measures of social distancing over the analysis period for our primary counties. We find that despite the intra-week variance in social distancing, there is an overall downward trend facing these measures. We see

---

<sup>4</sup> The measure *Median Hours at Home* is based on summed observed minutes at home throughout the day, regardless of whether or not these time episodes are contiguous. Because time during which a smartphone is turned off is not counted towards measured time spent at home, this measure is not sensitive to protesters potentially turning off their phones during the protests as a result of concern for potential digital surveillance or tracking by law enforcement. Irrespective of whether protesters are leaving their phones on or off, their activity would be appropriately reflected as a decrease in the median number of hours spent at home during the day.

that, comparing to our earlier sample period (e.g. the first five days of our sample), less people are staying at home and spending time at home during our later sample period (e.g. after June 1<sup>st</sup>).

### *3.3 COVID-19 Case Growth*

Finally, we measure county-level COVID-19 cumulative case growth using data from the Centers for Disease Control and Prevention (CDC), made public by the Kaiser Family Foundation.<sup>5</sup> For our COVID-19 case analysis period, May 15, 2020 through June 20, 2020, we estimate an average of 623.6 COVID-19 cases per 100,000 population in our sample. The average day-over-day COVID-19 case growth over the sample period was 215.2 cases (7.4 per 100,000 population). Our key variable measures the difference in the natural log in the cumulative number of COVID-19 cases on a given day and the natural log of the number of cases on the previous day. The mean of this variable is 0.019.

In Panel (d) of Appendix Figure 6, we show the trend in COVID-19 cases for the full sample of counties. We show that the slope is almost linear, which suggests that the rate of COVID-19 case growth is relatively constant over our sample period.

## **4. Methods**

The main objective of this study is to estimate how mass protests across the U.S. following the death of George Floyd have impacted social distancing and the growth in COVID-19 cases. Our research design capitalizes on variation in the differential outbreak of these

---

<sup>5</sup> These data are available at: <https://github.com/nytimes/covid-19-data>

protests over time across “treated” cities in conjunction with “never-treated” large city controls that did not experience any protests over the sample period.

We begin by pooling our sample of 208 primary counties, which include the largest 315 U.S. cities with a municipal population of at least 100,000 across 30 days and estimate a difference-in-differences model of the following form:

$$SD_{cst} = \gamma_0 + \sum_{j=0}^8 \gamma_j Protest_{ct}^j + \mathbf{X}_{ct} \beta_1 + \mathbf{Z}_{st} \beta_2 + \alpha_c + \tau_t + \varepsilon_{sct} \quad (1)$$

where  $SD_{cst}$  is one of our four measures of social distancing in county  $c$  in state  $s$  on day  $t$ .

$Protest_{ct}^j$  represents a set of mutually exclusive indicators set equal to 1 if county  $c$  saw a large city protest  $j$  days from day  $t$ , and captures any dynamics in social distancing behaviors following the protest outbreak. In addition,  $\mathbf{X}_{ct}$  is a vector of county-level time-varying controls including average temperature (in degrees Celsius) and an indicator for whether any measurable precipitation fell.<sup>6</sup>  $\mathbf{Z}_{st}$  is a vector of state-level time-varying controls including the natural log of COVID-19 testing rates, an indicator for whether the state had a shelter-in-place order (SIPO) in effect and indicators for whether the state permitted reopening of (i) restaurants or bars, (ii) retail stores (beyond curbside pickup), (iii) pet or personal care services (such as barbershops, nail salons and tattoo parlors), or (iv) entertainment activities (such as drive-in movie theatres, state parks, and public pools).<sup>7</sup> In addition,  $\alpha_c$  is a county fixed effect, and  $\tau_t$  is a day fixed effect. All regressions are weighted by the county population and standard errors are clustered at the county-level.

---

<sup>6</sup> These data are available at: <ftp://ftp.ncdc.noaa.gov/>

<sup>7</sup> Data for COVID-19 testing are available from COVID tracking project (see: <https://covidtracking.com>). Data for SIPO enactment are available in Mervosh et al. (2020) and Dave et al. (2020a). Data on reopening policies are compiled by our own searches of official county websites, county court records, local news agencies, and gubernatorial executive orders and proclamations.

The parameters of interest,  $\gamma_j$ , capture the net effects of the protests on mobility outside the home operating through all — reinforcing and counteracting, direct and indirect — behavioral pathways. In our main tables on social distancing, we present post-protest effects for various time windows up to 8 or more days following its outbreak.

Next, we examine effects of the protests on the growth in COVID-19 cases by using data from May 15, 2020 through June 20, 2020 (37 days) and estimating the following specification:

$$COVID\ Growth_{cst, t-1} = \gamma_0 + \sum_{j=0}^{21} \gamma_j Protest_{ct}^j + \mathbf{X}_{ct} \beta_1 + \mathbf{Z}_{st} \beta_2 + \alpha_c + \tau_t + \varepsilon_{sct} \quad (2)$$

where  $COVID\ Growth_{cst, t-1}$  is the difference in the natural log of cumulative COVID-19 cases in county  $c$  on day  $t$  and day  $t-1$ , that is day-over-day COVID-19 case growth. Because we have additional data on cases, we are able to estimate case effects up to 21 or more days following the day of the protest, a period well beyond the median incubation period of COVID-19 (5.1 days) (Li et al. 2020) when we would expect case divergence if there were an effect from the protest gathering (Friedson et al. 2020; Dave et al. 2020a, b, c; Courtemanche et al. 2020a, b).

Our difference-in-differences estimates of protest effects will only be unbiased in the absence of (i) endogenous protests, that is, protests starting because of differential COVID-19 case growth, and (ii) unmeasured county-specific unobservables that could be correlated with protests and with COVID-19 case growth.

We take two tacks to assess the common trends assumption. First, we conduct an event-study analysis, decomposing the estimated protest effect into coefficients up to 7 days prior to the outbreak of the event and up to 10 (for social distancing) or 21 days (for cases) following the onset of protests. This will provide a descriptive test for whether protests are endogenous to the outcomes under study or correlated with differential trends in outcomes across the treated and

non-treated counties. Second, in a robustness check, we test the sensitivity of estimates from equations (1) and (2) to additional controls for county-specific linear time trends, which may capture (i) differences in the trajectory of the COVID-19 epidemic across counties, and (ii) unobserved time-varying heterogeneity at the county level such as enforcement of local mitigation policies or outreach to historically marginalized populations.

Next, we allow for spillover effects of protests by augmenting our analysis sample to include 42 “secondary” counties to which cities may extend. In addition, in supplemental analysis, we also augment our treatment group to include 739 border counties to the treatment counties. We then re-estimate equations (1) and (2), turning the protest variable on for all “treated” counties (primary, secondary, and non-secondary border counties) when a primary county has its protest. This will allow us to capture those protesters who may travel from neighboring jurisdictions to participate and potentially spread COVID-19 back in their home counties. In these regressions, standard errors are clustered at the level of the 208 “primary counties” associated with each group of border counties.

Finally, we examine heterogeneity in the impact of urban protests across several key dimensions of the protests, and estimate the following specification interacting the post-protest time windows with the relevant characteristic:

$$SD_{cst} = \gamma_0 + \sum_{j=0}^8 \gamma_j \text{Protest}_{ct}^j * T_c + \mathbf{X}_{ct} \beta_1 + \mathbf{Z}_{st} \beta_2 + \alpha_c + \tau_t + \varepsilon_{sct} \quad (3a)$$

$$\text{COVID Growth}_{cst} = \gamma_0 + \sum_{j=0}^{21} \gamma_j \text{Protest}_{ct}^j * T_c + \mathbf{X}_{ct} \beta_1 + \mathbf{Z}_{st} \beta_2 + \alpha_c + \tau_t + \varepsilon_{sct} \quad (3b)$$

where  $T_c$  measures particular characteristics of the protest that could differentially affect social distancing and COVID-19 case growth. These include (i)  $Violent_c$ , an indicator for whether the

protest was accompanied by media reports of violence (i.e. arrests, use of tear gas, looting), (ii) *Persistent<sub>c</sub>*, an indicator for whether the protest lasted for at least three days, (iii) *Protest Size<sub>c</sub>*, an indicator for whether the protest was reported to consist of over 1,000 individuals on at least one day of the protest, and (iv) *Curfew<sub>c</sub>*, an indicator for whether the city’s mayor issued a curfew order at some point during the protest period.<sup>8</sup> In addition, in a series of auxiliary analysis, we explore whether there were heterogeneous effects by whether the protest occurred early in calendar time (on May 26, 27, or 28) or later, by whether the city municipal population size was greater than 500,000 individuals, and by the racial composition of the county (whether the county population exceeded the mean share of non-Hispanic whites, based on the treated counties).

## 5. Results

Our main findings are shown in Figure 2 and Tables 1 through 3. In Table 1 and in Panels (a) through (c) of Figure 2, we present the net effects of protest onset on mobility. Estimates of the heterogeneity analyses with respect to these social distancing measures are presented in Table 2. Then, in Table 3 and Panel (d) of Figure 2, we present and discuss how the mass protests affected COVID-19 case growth. Additional analyses addressing specific issues are presented in the Appendix.

### 4.1 Mass Protests and Social Distancing

---

<sup>8</sup> 47.7 percent of all treatment cities (and 60.4 percent of all treatment counties) had a protest that was accompanied by media reports of violence; and 71.9 percent of all treatment cities (and 82.9 percent of all treatment counties) had a protest that lasted for three or more days; 36.3 percent of all treatment cities (and 47.5 percent of all treatment counties) had a protest with reported attendance exceeding 1,000 persons; and 51.9 treatment cities (and 49.0 percent of all treatment counties) had a protest that was accompanied by a city curfew.

Panels (a) through (c) in Figure 2 visually present the conditional event study analyses for our three measures of social distancing, drawn from Safegraph’s anonymized geotagged cell-phone data. Panel (a) plots the trend difference between the treated and non-treated counties, pre- and post-protest outbreak, for the percent of respondents staying at home throughout the day.<sup>9</sup> Panels (b) and (c) repeat this exercise for intensity measures, respectively capturing the median percent of time spent at home daily and the median daily hours spent at home.

These analyses underscore three key points. First, it is validating that we find no evidence that stay-at-home behaviors trend differently in treatment and control counties before the outbreak of the protests. Trends between the treated and non-treated counties essentially move in lock-step, reflected in the flat differential trends over the pre-protest periods. This instills a degree of confidence that the timing of the protests is exogenous to trends in social distancing.

Second, where there are social distancing effects, they only appear to materialize after the onset of the protests. Specifically, after the outbreak of an urban protest, we find, on average, an *increase* in stay-at-home behaviors in the primary county encompassing the city. That overall social distancing behavior increases *after the mass protests* is notable, as this finding contrasts with the general secular decline in sheltering-at-home taking place across the sample period (see Appendix Figure 6). Our findings suggest that any direct decrease in social distancing among the subset of the population participating in the protests is more than offset by increasing social distancing behavior among others who may choose to shelter-at-home and circumvent public places while the protests are underway. This latter behavioral pathway is consistent with studies

---

<sup>9</sup> Estimates plotted in Figure 2 are conditional on state-level log testing rates, indicators for shelter-in-place policies and reopening policies, county-level average temperature and an indicator for precipitation on the given day, and day and county fixed effects.

that find perceived safety concerns, crime, and violence to be significant barriers to participation in physical activity and spending time outdoors (Janke, Propper and Shields 2016; Roman and Chalfin 2008; Foster and Giles-Corti 2008). Moreover, to the extent that the killing of George Floyd, and the ensuing civil unrest and mass protests, also impacted residents' mental health and stress, this may further lead to decreased activity levels and an increase in stay-at-home behaviors.<sup>10</sup>

Third, the event study analyses shown in Panels (a) through (c) of Figure 2 point to some dynamics in the response of stay-at-home behaviors. The rise in social distancing emerges after about three days following the protest outbreak. Effects get stronger over the next few days and peak within a week following the protests, before leveling off and showing some suggestive signs of a decline. Hence, the effects of the protests on social distancing appear to be somewhat transitory and may fade over the longer-run, possibly as the violence and scope of the protests abate.

The patterns evident in Figure 2 presage our main estimates of the average net effect of the protests on each of the social distancing outcomes, based on equation (1) and reported in Table 1. We present estimates both with and without controls as a gauge of the extent to which the presence and timing of the protests are correlated with other observables. Our preferred estimates are from the saturated models that include COVID-19 testing rates and other predictors of social distancing, though it is reassuring that the results not very sensitive to these controls.

Panel I presents results for primary counties that include the large cities under study. As shown in column (2), we find an increase in the percent of county residents staying at home full-time following protest onset, with the effect getting progressively stronger and statistically

---

<sup>10</sup> Studies have causally linked crime and violence to poor mental health (Cornaglia, Feldman and Leigh, 2014; Dustmann and Fasani 2015; Wang and Yang 2013; Rubin et al. 2005).

significant after the third day. Within 4 to 7 days, there is about a 0.70 percentage point daily increase (2.0 percent increase relative to the mean) in residents remaining at home all day. The magnification of the effect over the first few days likely reflects dynamics in the behavioral response with protests gaining momentum and numbers, occurring on consecutive or multiple days, and being accompanied by more reports of violence in certain cities – dimensions that we return to below in assessing heterogeneity in the response. Estimates from the intensity measures of staying at home follow a similar pattern, indicating on average a 0.46 percentage point increase in the median percent of time spent at home and a 0.18 hour increase in the median time spent at home (0.5 to 1.4 percent relative to the mean), within 4-7 days of the start of the protests.<sup>11</sup> There is also evidence that social distancing effects level off or decline following about a week after the protests, which could suggest either that the impact of the protests are fading, or are cyclical depending on when future protests are organized.<sup>12</sup>

One concern with our findings is that our estimated social distancing effects may not fully capture any direct reduction in stay-at-home behaviors driven by the sub-population of protesters if protesters are being drawn from outside the city. This is partly addressed by our focus on the primary county – which encompasses the city – as the unit of analysis. However, in Panel II of Table 1, we widen the spatial unit to include both primary and secondary counties for cities that partly cross over into another county. Models reported in Appendix Table 2 further expand the geographic cluster to include counties that border the treated primary county (county that encloses the protest city). To the extent that protests in cities are drawing participants from

---

<sup>11</sup> Results are robust to controlling for county-specific linear time trends though less precisely estimated (see Appendix Table 1).

<sup>12</sup> Data from Google Trends show that search queries on Google related to “protest”, “protest today”, “George Floyd protest”, and “Black Lives Matter protest” peaked between May 31 and June 2, five to eight days since the start of the early protests. Similarly, searches related to “protest violence” and “protest looting” peaked between May 31 and June 1.

their larger parent counties or from other surrounding counties, our estimates will capture both the direct social distancing effects on resident protesters in these counties as well as behavioral effects on other non-participating residents. The estimates remain largely similar across both samples as we broaden the geographical unit to capture non-local protesters.

#### *4.2 Heterogeneity in the Effects of the Protests on Social Distancing*

Given consistent indications that the mass protests appear to have increased net stay-at-home behaviors — potentially reflecting an overriding behavioral effect among non-participants — we next assess whether this average response differs across relevant characteristics of the protests. We present these results in Table 2, based on equation (3a) that interacts a specific dimension of the protest with the post-protest timing windows.

If the increase in social distancing among non-participating residents is induced by safety and related concerns, then one would expect protests that are persistent (ongoing for 3 or more days) or that have turned violent to generate a stronger response. In Panel I, we specifically assess treatment effects across protests which have turned violent as compared to those that have not. We generally find increases in the percent of residents staying at home full-time and time spent at home for both sets of protests, though effects are expectedly stronger when protests are accompanied by media reports of violence.

In Panel II, we specifically assess treatment effects across protests which are ongoing as compared to those that last only one or two days. In cases when protests are ongoing, we find that within 4-7 days after the onset of the first protest, the percent of residents staying at home all day increases by 0.73 percentage points, which then falls to 0.53 percentage points after seven days; both estimates are statistically significant. In contrast, effects in counties where the

protests are not persistent are smaller (0.37 percentage points within 4-7 days and 0.38 percentage point after 7 days) and are statistically indistinguishable from zero.

Panel III considers differences in the social distancing response based on the size of the protest. Specifically, we compare treatment effects across cities where the protest size exceeded 1,000 protesters vs. those that drew smaller protests. Larger protests may be perceived as being more disruptive and carrying a larger threat of violence. While there are significant increases in social distancing in both cases, there are indications that the increase is larger when protests draw a greater number of participants.

Finally, in response to protests that have turned violent and disruptive or in anticipation of such, some cities have issued nighttime curfews. In Panel IV, we assess whether these curfews may be “mechanically” driving the increase in sheltering-at-home that we find. In addition to their direct intended effects, curfews could also signal to residents the potential for the eruption of violence, and may further elicit a behavioral response due to this information signal. We find increases in staying-at-home behaviors across both cities with and without curfews, though effect magnitudes are expectedly larger when the city has imposed a curfew order at some point during the protest period.

In summary, the estimates from Table 2 provide a form of a “dose-response” test. We find that overall the onset of mass protests has led to an increase in social distancing, on the net, which is consistent with a counteracting response among non-protesting residents who may be avoiding venturing out as the protests are underway, possibly due to perceived safety concerns. The behavioral response may also reflect a diminution of economic and business activity. For instance, if retail outlets and restaurants are closed as a precautionary measure in anticipation of violence and disruption from the protests, then this would reduce the demand for out-of-home

mobility. If these behavioral pathways are at play, it is reasonable to expect stronger responses when the protests are bigger in scope, persistent, and violent. The estimates in Table 2 largely confirm these patterns.<sup>13</sup>

Nevertheless, we also generally find an increase in social distancing behaviors across all margins. This is not altogether surprising given the geographic diffusion of the protests, including the national media attention. Hence, even if a protest in a given city is not violent, large, or sustained, there are likely spillovers from media reports of violence and disruptions from other cities; in this case, we would expect some behavioral response since there is a non-zero probability that a given protest could turn violent in the future.<sup>14</sup>

#### *4.3 Mass Protests and COVID-19 Case Growth*

Our findings thus far do not indicate that the outbreak of protests on the net has led residents to spend more time outside their homes. If anything, we find consistent evidence of an increase in social distancing behaviors on average. Prima facie, given this increase in sheltering-at-home, we would not expect any strong increases in COVID-19 case growth. However, a key concern has been that local protesters who travel back home may be spreading the coronavirus to

---

<sup>13</sup> Appendix Figure 7 presents event study graphs for each of the margins considered in Table 2. They largely confirm flat differential trends prior to the onset of the protests, and increases in stay-at-home behaviors up to 7 days post-protest which subsequently diminish in magnitude after this time.

<sup>14</sup> In supplementary analyses (see Appendix Table 3), we also assess whether there were heterogeneous effects across other dimensions. Panel I considers differential effects based on whether the protests occurred early in calendar time, within the first 3 days after the death of George Floyd. These protests were arguably spontaneous, unanticipated, and exogenous to any considerations of COVID-19. We find significantly larger increases in social distancing following these earlier protests. Many of the early protests also occurred among the larger cities. In Panel II, we specifically decompose the treatment effect into separate effects across larger cities ( $\geq 500,000$  population) and smaller cities. While we find significant effects across the board, the effect magnitudes are generally higher for protests occurring in larger cities. Given that the protests were united against police brutality and racism in policing, and conjoined with the Black Lives Matter movement, we also assess whether responses in social distancing differed across the racial composition of the county (Panel III). We do not find any consistent or meaningful differences across our three social distancing outcomes across counties with a larger ( $\geq$  weighted mean of 56 percent among treated counties) share of non-Hispanic whites vs. those with a smaller share.

others. In this case, it is possible that we may see an increase in COVID-19 case growth, as a result of community spread from this subset of population (protest participants) for whom there was by definition an increase in out-of-home mobility and reduced social distancing.

Panel (d) in Figure 2 presents the event study analysis for daily growth in confirmed cases. Trends between the treated and non-treated counties are virtually identical prior to the protests. This is reassuring and suggests that the timing of the protests is not correlated with trends in COVID-19 case growth or unobservable determinants of case growth. We find no significant divergence in the trends after the protests. While there is some suggestive decrease in the daily growth rates in cases after 21 or more days subsequent to the start of the protests, the estimates are statistically insignificant and also fairly small in magnitude.

Estimates in Table 3, based on equations (2) and (3b), confirm these findings. In no case do we find any significant or substantial increase in the growth in COVID-19 caseload (Panel I). Our point estimates are close to zero and our confidence intervals are tight enough to rule out, with 95 percent confidence, an increase in daily case growth exceeding 0.51 percent in a county after 21 or more days following the onset of protests.

These results are robust to widening the geographic unit of analysis to include primary and secondary counties (Panel II) and border counties (Appendix Table 4); hence, accounting for potential spillovers over a larger spatial unit as protesters travel back home does not alter our results. Our estimates are also robust to controlling for county-specific linear trends (Appendix Table 5). The trends help to account for unobserved factors driving the exponential growth trajectory of COVID-19 transmissions, and effects in these models are identified off deviations from this trend growth. These controls may also be important in controlling for heterogeneity across counties in the timing of coronavirus outbreak as well as for heterogeneity in growth of

COVID-19 testing. Finally, as reported in Panel III, we do not find any evidence of differential effects on case growth across specific dimensions of the protest (violent protests, persistent protests, size of protests, or the existence of curfews).<sup>15</sup>

One concern regarding the lack of any strong effects for COVID-19 case growth is that the post-protest sample period might not be sufficiently long enough as of yet to detect a resurgence or increase in the infection rates. While this is a possibility, we also note that our sample includes at least 21 days of data following the early protests that took place in 154 cities (during the first five days following George Floyd's death), at least 18 days of data following protests in 242 cities, and at least 16 days of data for 257 cities that experienced protests (during the first week following George Floyd's death). The median incubation period for COVID-19 is 5.1 days, with 75 percent of all infected individuals experiencing symptoms within 6.7 days and 97.5 percent within 11.5 days (Li et al. 2020). Prior work has uncovered strong effects of shelter-in-place orders on confirmed cases within five to ten days following the adoption of the policy (Friedson et al. 2020; Dave et al. 2020 a, b; c; Courtemanche et al. 2020a, b). Further, other work in economics has detected secondary spread of COVID-19 from travel due to spring break at a 2-week time horizon (Mangrum and Niekamp 2020). Hence, if there are any meaningful changes in COVID-19 cases as a result of the mass protests, our post-protest window is long enough to be able to capture them.

---

<sup>15</sup> Appendix Figure 8 presents the event study graphs for COVID-19 case growth across these margins. If anything, there is a very slight declining trend in case growth following protest onset where we also generally found a relatively larger increase in social distancing; all effects however are small and statistically insignificant. Appendix Table 6 assesses heterogeneous effects across: whether the protests occurred early in calendar time (Panel I); larger vs. smaller cities (Panel II); and racial composition of the county (Panel III). There are no indications of any significant or substantial increase in the growth of COVID-19 cases across any of these margins, by three or more weeks following the start of the protests.

We also estimate separate protest effects for each of the early protest cities (cities experiencing protests on May 28 or earlier), in order to assess whether our finding of no significant or substantial effects on COVID-19 cases is masking any meaningful changes for certain cities. We employ a synthetic control approach to generate a counterfactual for each primary county (Abadie et al. 2010), with the donor pool comprising counties where no large city held any protest during the sample period or where the first protest occurred much later (less than five days prior to the end of the sample, a period not long enough to generate substantial effects on COVID-19 cases given the disease’s incubation period) (Li et al. 2020; Friedson et al. 2020; Dave et al. 2020a). Analyses for the 13 counties for which pre-treatment COVID-19 case levels and trends were well-matched are visually presented in Appendix Figure 9.<sup>16</sup> Cases are expectedly trending upwards across all of these counties and their synthetic controls. However, with the exception for Maricopa County, Arizona, we find essentially no evidence that protests contributed to significant or substantial increases in COVID-19 during the period following protest onset, consistent with our main difference-in-differences findings in Table 3.<sup>17</sup>

Finally, we assess the sensitivity of these estimates to different sources of timing-based identification. As our research design is capitalizing on variation in the timing of the protests across cities, in conjunction with cities that did not experience any protests, the estimated

---

<sup>16</sup> We match on the COVID-19 confirmed case rate (per 100,000 population) for each of the pre-protest days. We focus on protest counties where the quality of the pre-treatment match was good, as measured by the mean squared prediction error over the pre-protest period. For four of the early protest counties (Hennepin, MN; San Bernardino, CA; Los Angeles, CA; and Solano, CA), the quality of the pre-treatment match, between the county and its synthetically generated counterfactual from the donor pool, was quite poor. Thus, estimated post-protest effects for these counties are not regarded as credible.

<sup>17</sup> The effect size for Maricopa County implies an increase of 33.2 COVID-19 cases per 100,000 population within 13 days following the start of protests on May 28. The permutation-based p-value for this estimate is 0.067. The p-values for the effects for other protest counties shown in Appendix Figure 9, that show COVID-19 case increases relative to their synthetic control (Jefferson, Texas and Shelby, Tennessee), were never shown to have estimated effects that were statistically distinguishable from zero at conventional levels, with p-values ranging from 0.53 to 0.67.

treatment effect is identified off the many sub-experiments comparing: 1) counties with early and later-occurring protests with counties containing large cities that did not experience any protests; 2) counties witnessing early protests with counties where protests occurred later; and 3) counties with later-occurring protests compared to counties with early onset of protests as controls (Goodman-Bacon 2018). With dynamic treatment effects, as there appear to be for social distancing outcomes and which also may be likely with COVID-19 cases, using counties with early protests as a control for the treated later-protesting counties may underestimate the treatment effect.<sup>18</sup> In Appendix Table 7, we draw on subsets of the treated counties to identify our effects, in turn excluding counties with late-occurring protests, counties with early-occurring protests, and counties that saw no protests from the sample. These results confirm that there is no discernible change in the growth of COVID-19 cases, among early- or later-protesting counties, even after three or more weeks subsequent to the onset of protests, irrespective of which counties form the counterfactual.<sup>19</sup>

## ***6. Conclusions***

This study is the first to empirically examine the linkage between the 2020 Black Lives Matter protests and the spread of COVID-19, which has been a point of concern among public health officials and the media (Bacon 2020; Goldberg 2020; Harmon and Rojas 2020). While it

---

<sup>18</sup> This is because the trajectory in outcomes for counties with the early protests, at the time when other counties witness their own protests at a later point in time, may still be affected by the “treatment” (that is, by the early protests). In this context, it may be better to compare treated early-protesting counties with yet untreated later-protesting counties or never-protesting counties, and compare treated later-protesting counties with never-protesting counties (Goodman-Bacon 2018). At the same time, however, counties with large cities that did not contain any protests may be different than counties that contained cities with protests. This suggests that it may also be important draw on variation just among the protest counties, excluding the “never protesters” from contributing any identifying variation (Dave et al. 2020b).

<sup>19</sup> This is consistent with the results presented in Appendix Table 6 (Panel I), which separated out the effects across counties that saw the early wave of protests during the first three days following the death of George Floyd.

is almost certain that the protests caused a decrease in social distancing behavior among protest attendees, we demonstrate that effect of the protests on the social distancing behavior of the entire population residing in counties with large urban protests was *positive*. Likewise, while it is possible that the protests caused an increase in the spread of COVID-19 among those who attended the protests, we demonstrate that the protests had little effect on the spread of COVID-19 for the entire population of the counties with protests during the more than three weeks following protest onset. In most cases, the estimated longer-run effect (post-21 days) was negative, though not statistically distinguishable from zero.<sup>20</sup>

While the exact mechanisms for these findings cannot be conclusively known with the data available, the results are consistent with avoidance behavior on the part of the non-attending population. This is consistent with the literature on crime, violence, and perceived safety amongst the general population, who in the presence of crime or violence choose to remain home more often (Bennet et al. 2007; Stafford et al. 2007; Chalfin 2008; Janke, Propper and Shields 2016; Yu and Lippert 2016; Stolzenberg, D’Alessio and Flexon 2019). While Black Lives Matter protests are protected speech and not criminal activities, they may still be viewed as dangerous by non-attendees due to the occasional presence of violence, including police response to these protests, and elicit avoidance behavior.

There are other possible explanations for our findings as well, such as avoiding travel outside the home due to additional traffic congestion or street closures, or due to lack of available activities from businesses closures near protest sites. Additionally, non-attendees may perceive a higher risk of COVID-19 infection due to the protests and choose to stay home.

---

<sup>20</sup> Our results do not necessarily extrapolate to imply that large outdoor gatherings per se are safe. In the case of the protests that we study, compensatory behavioral responses among the non-participating subpopulation appear to be driving the net effects that we find in the overall population.

Finally, it is possible that the result of suggestive lower spread of COVID-19 relative to non-protesting cities is due in part to characteristics of the protesters. For example, protest attendees may have mitigated the spread of COVID-19 via infection countermeasures such as wearing masks. The attendees may further be a selected subpopulation of younger individuals who if infected have less severe symptoms (Liao et al. 2020) and thus may never get tested and not show up in the official COVID-19 numbers.

Regardless of the underlying mechanisms, our findings show that the protests and the fight against COVID-19 were *on net* aligned. It is important to underscore that our findings do not imply that that this was the case for all parts of the population. The net effect of increased sheltering and decreased case growth could mask adverse outcomes within a subset of the population (specifically protest attendees). This could hypothetically cause a redistribution of public health benefits (and costs) across demographic groups, and could only be measured with more granular data that to our knowledge does not exist at present.

However, when considering the results' implications for the entire population: public speech and public health did not trade off against each other in this case. Our findings also highlight the importance of understanding the behavior of all relevant populations when conducting analysis in the realm of social science in general, and public health in particular: the most visible portion of the population is not always the primary driver of the outcome of interest.

## 7. References

- Abadie, A., Diamond, A. and Hainmueller, J. (2010). “Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California’s Tobacco Control Program.” *Journal of the American Statistical Association* 105 (490): 493–505.
- Abouk, R, and Heydari, B. (2020). “The Immediate Effect of COVID-19 Policies on Social Distancing Behavior in the United States.” Retrieved from SSRN: <https://ssrn.com/abstract=3571421>
- Andersen, M., Maclean, J.C., Pesko, M.F., and Simon, K.I. (2020). “Effect of a Federal Paid Sick Leave Mandate on Working and Staying at Home: Evidence from Cellular Device Data.” *NBER Working Paper No. 27138*.
- Australian Government Department of Health. 2020. “Social Distancing for Coronavirus (COVID-19).” Available at: <https://www.health.gov.au/news/health-alerts/novel-coronavirus-2019-ncov-health-alert/how-to-protect-yourself-and-others-from-coronavirus-covid-19/social-distancing-for-coronavirus-covid-19>
- Bai, Yan, Lingsheng Yao, Tao Wei, Fei Tian, Dong-Yan Jin, Lijuan Chen, and Meiyun Wang. 2020. "Presumed asymptomatic carrier transmission of COVID-19." *JAMA*, 323(14): 1406-1407.
- Bacon, John. (2020, May 31). “Coronavirus updates: George Floyd protests could fuel COVID cases, Trump postpones G7 summit” *USA Today*.
- Bennett, G.G., McNeill, L.H., Wolin, K.Y., Duncan, D.T., Puleo, E. and Emmons, K.M., 2007. Safe to walk? Neighborhood safety and physical activity among public housing residents. *PLoS medicine*, 4(10).
- Black Lives Matter. 2020. “About Black Lives Matter” Available at: <https://blacklivesmatter.com/about/>
- Centers for Disease Control and Prevention. 2020a. “Coronavirus Disease 2019 (COVID-19): How It Spreads.” Available at: [https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/how-covid-spreads.html?CDC\\_AA\\_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fprepare%2Ftransmission.html](https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/how-covid-spreads.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fprepare%2Ftransmission.html)
- Centers for Disease Control. 2020b. “COVID-19 How to Protect Yourself and Others.” Available at: <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html>
- Cornaglia, F., Feldman, N.E. and Leigh, A., 2014. “Crime and Mental Well-being.” *Journal of Human Resources*, 49(1), pp.110-140.

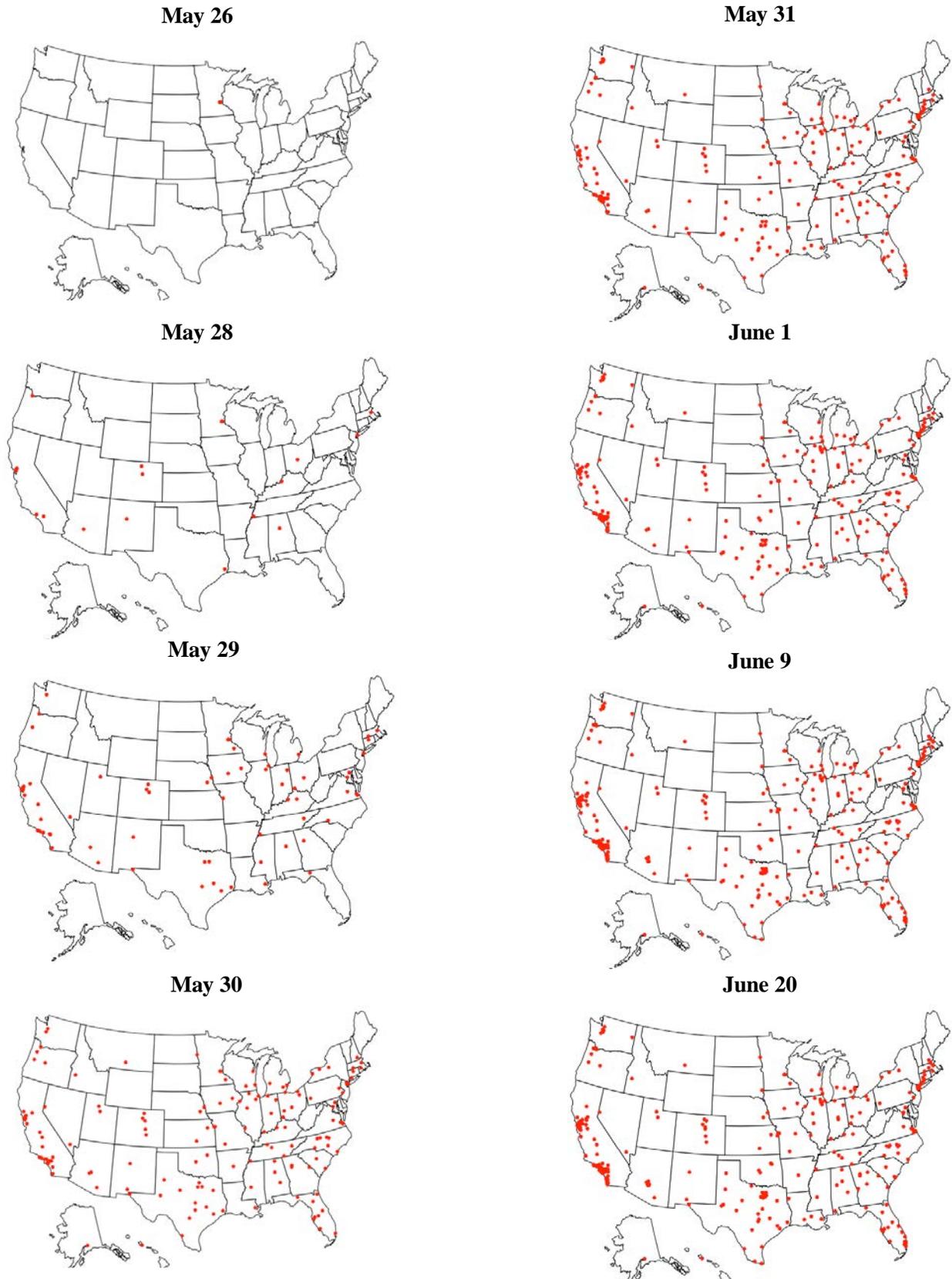
- Courtemanche, Charles, Joseph Garuccio, Anh Le, Joshua C. Pinkston, and Aaron Yelowitz. 2020a. "Strong Social Distancing Measures In The United States Reduced The COVID-19 Growth Rate." *Health Affairs*, in press.
- Courtemanche, Charles J., Joseph Garuccio, Anh Le, Joshua C. Pinkston, and Aaron Yelowitz. 2020b. "Did Social-Distancing Measures in Kentucky Help to Flatten the COVID-19 Curve?" Institute for the Study of Free Enterprise Working Paper 2020-4.
- Dave, D.M., Friedson, A.I., Matsuzawa, K., McNichols, D. and Sabia, J.J., 2020a. "Did the Wisconsin Supreme Court Restart the COVID-19 Epidemic? Evidence from a Natural Experiment." *NBER Working Paper No. 27322*.
- Dave, D.M., Friedson, A.I., Matsuzawa, K. and Sabia, J.J., 2020b. "When Do Shelter-In-Place Orders Fight COVID-19 Best? Policy Heterogeneity Across States And Adoption Time." *NBER Working Paper No. 27091*.
- Dave, D.M., Friedson, A.I., Matsuzawa, K. Sabia, J.J., and Safford, S. 2020c. "Were Urban Cowboys Enough to Control COVID-19? Local Shelter-In-Place Orders and Coronavirus Case Growth." *NBER Working Paper No. 27229*.
- Dustmann, C. and Fasani, F., 2016. "The Effect of Local Area Crime on Mental Health." *The Economic Journal*, 126(593), pp.978-1017.
- Fineberg, Harvey. 2020. "Rapid Expert Consultation on the Possibility of Bioaerosol Spread of SARS-CoV-2 for the COVID-19 Pandemic" The National Academies of Science, Engineering, Medicine, April 1. Available at: <https://www.nap.edu/read/25769/chapter/1#3>
- Foster, S. and Giles-Corti, B., 2008. "The Built Environment, Neighborhood Crime and Constrained Physical Activity: An Exploration of Inconsistent Findings." *Preventive Medicine*, 47(3), pp.241-251.
- Furber, Matt, Audra D. S. Burch and Frances Robles. (2020, May 29). "What Happened in the Chaotic Moments Before George Floyd Died." *The New York Times*.
- Goldberg, Emma (2020, June 7). "George Floyd Protests Add New Front Line for Coronavirus Doctors" *The New York Times*
- Goodman-Bacon, Andrew. 2018. "Difference-in-Differences with Variation in Treatment Timing." *NBER Working Paper No. 25108*.
- Gupta, S., Nguyen, T.D., Rojas, F.L., Raman, S., Lee, B., Bento, A., Simon, K.I. and Wing, C. (2020). "Tracking Public and Private Responses to the COVID-19 Epidemic: Evidence from State and Local Government Actions" *NBER Working Paper No. 27027*.

- Harmon, Amy, and Rick Rojas. (2020, June 7) “A Delicate Balance: Weighing Protest Against the Risks of the Coronavirus” *The New York Times*
- Hill, Evan, Ainara Tiefenthäler, Christiaan Triebert, Drew Jordan, Haley Willis and Robin Stein. (2020, May 31). “8 Minutes and 46 Seconds: How George Floyd Was Killed in Police Custody.” *The New York Times*.
- Friedson, Andrew I., Drew McNichols, Joseph J. Sabia, and Dhaval Dave. 2020. “Did California’s Shelter-in-Place Order Work? Early Coronavirus-Related Public Health Effects.” National Bureau of Economic Research Working Paper No. 26992.
- Janke, K., Propper, C. and Shields, M.A., 2016. Assaults, murders and walkers: The impact of violent crime on physical activity. *Journal of Health Economics*, 47, pp.34-49.
- Johns Hopkins University. 2020. “COVID-19 Case Tracker.” Available online: <https://coronavirus.jhu.edu/map.html>
- Khazan, Olga. (2020, June 2). “Why People Loot” *The Atlantic*.
- Kim, Catherine. (2020, May 31). “Images of police using violence against peaceful protesters are going viral” *Vox*.
- Lasry, A., Kidder, D., Hast, M., Poovey, J., Sunshine, G., Zviedrite, N., Ahmed, F. and Ethier, K.A., (2020). “Timing of Community Mitigation And Changes in Reported COVID-19 And Community Mobility—Four US metropolitan Areas.” *Morbidity and Mortality Weekly Report*, 69(15): 451-457.
- Li, Peng, Ji-Bo Fu, Ke-Feng Li, Yan Chen, Hong-Ling Wang, Lei-Jie Liu, Jie-Nan Liu, Yong-Li Zhang, She-Lan Liu, An Tang, Zhen-Dong Tong, and Jian-Bo Yan. 2020. “Transmission of COVID-19 In The Terminal Stage of Incubation Period: A Familial Cluster.” *International Journal of Infectious Diseases*, March 17. Available at: [https://www.ijidonline.com/article/S1201-9712\(20\)30146-6/fulltext](https://www.ijidonline.com/article/S1201-9712(20)30146-6/fulltext)
- Liao, J., Fan, S., Chen, J., Wu, J., Xu, S., Guo, Y., Li, C., Zhang, X., Wu, C., Mou, H. and Song, C., 2020. Epidemiological and clinical characteristics of COVID-19 in adolescents and young adults. *The Innovation*, 1(1), p.100001.
- Mangrum, D. and Niekamp, P., 2020. College Student Contribution to Local COVID-19 Spread: Evidence from University Spring Break Timing. Available at SSRN 3606811.
- Pan, Xingfei, Dexiong Chen, Yong Xia, Xinwei Wu, Tangsheng Li, Xueting Ou, Liyang Zhou, and Jing Liu. 2020. “Asymptomatic cases in a family cluster with SARS-CoV-2 infection.” *The Lancet Infectious Diseases*, 20(4): 410-411.
- Peterson, Hayley. (2020, May 29). “A Minneapolis Target store was destroyed by looting. Photos show the flooded remains.” *Business Insider*.

- Public Health England. 2020. “Guidance on Social Distancing for Everyone in the U.K.” Available at: <https://www.gov.uk/government/publications/covid-19-guidance-on-social-distancing-and-for-vulnerable-people/guidance-on-social-distancing-for-everyone-in-the-uk-and-protecting-older-people-and-vulnerable-adults>
- Public Health Agency of Canada. 2020. “Community-Based Measures to Mitigate the Spread of Coronavirus Disease (COVID-19) in Canada.” Available at: <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/public-health-measures-mitigate-covid-19.html>
- Roman, C.G. and Chalfin, A., 2008. “Fear of Walking Outdoors: A Multilevel Ecologic Analysis of Crime and Disorder.” *American Journal of Preventive Medicine*, 34(4), pp.306-312.
- Rothe C, Schunk M, Sothmann P, et al. 2020. “Transmission of 2019-nCoV Infection from an Asymptomatic Contact in Germany.” *New England Journal of Medicine*, 382:970-971
- Rothenberg, C., Achanta, S., Svendsen, E.R. and Jordt, S.E., 2016. “Tear gas: an epidemiological and mechanistic reassessment.” *Annals of the New York Academy of Sciences*, 1378(1), p.96.
- Rubin, G.J., Brewin, C.R., Greenberg, N., Simpson, J. and Wessely, S., 2005. “Psychological and behavioural reactions to the bombings in London on 7 July 2005: cross sectional survey of a representative sample of Londoners.” *BMJ*, 331(7517), p.606.
- Stafford, M., Cummins, S., Ellaway, A., Sacker, A., Wiggins, R.D. and Macintyre, S., 2007. Pathways to obesity: identifying local, modifiable determinants of physical activity and diet. *Social Science & Medicine*, 65(9), pp.1882-1897.
- Simon, Mallory. (2020, June 5). “Over 1,000 health professionals sign a letter saying, Don't shut down protests using coronavirus concerns as an excuse.” *CNN*.
- Stolzenberg, L., D’Alessio, S.J. and Flexon, J.L., 2019. The Impact of Violent Crime on Obesity. *Social Sciences*, 8(12), p.329.
- State of Minnesota. 2020. “Warrant: State of Minnesota v Derek Michael Chauvin” Available at: <https://www.hennepinattorney.org/-/media/Attorney/Derek-Chauvin-Criminal-Complaint.pdf>
- Taylor, Derrick Bryson. (2020, June 9) “George Floyd Protests: A Timeline” *The New York Times*.
- Wang, Y. and Yang, M., 2013. “Crisis-induced depression, physical activity and dietary intake among young adults: Evidence from the 9/11 terrorist attacks.” *Economics & Human Biology*, 11(2), pp.206-220.

- Wei, J. and Li, Y., 2016. “Airborne spread of infectious agents in the indoor environment.” *American Journal of Infection Control*, 44(9), pp.S102-S108.
- White House. 2020. “The President’s Coronavirus Guidelines for America.” Available at: [https://www.whitehouse.gov/wp-content/uploads/2020/03/03.16.20\\_coronavirus-guidance\\_8.5x11\\_315PM.pdf](https://www.whitehouse.gov/wp-content/uploads/2020/03/03.16.20_coronavirus-guidance_8.5x11_315PM.pdf)
- World Health Organization. 2020. “Q&A: Similarities and Differences – COVID-19 and Influenza.” Available at: <https://www.who.int/news-room/q-a-detail/q-a-similarities-and-%20differences-covid-19-and-influenza>
- Xie, X., Li, Y., Sun, H. and Liu, L., 2009. Exhaled droplets due to talking and coughing. *Journal of the Royal Society Interface*, 6(suppl\_6), pp.S703-S714.
- Yu, E. and Lippert, A.M., 2016. Neighborhood crime rate, weight-related behaviors, and obesity: a systematic review of the literature. *Sociology Compass*, 10(3), pp.187-207.

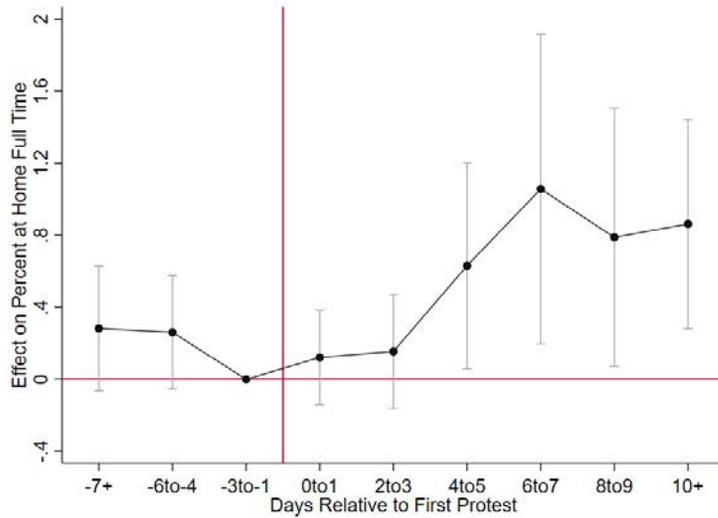
**Figure 1. Protests in Cities with Municipal Population of Least 100,000 Persons**



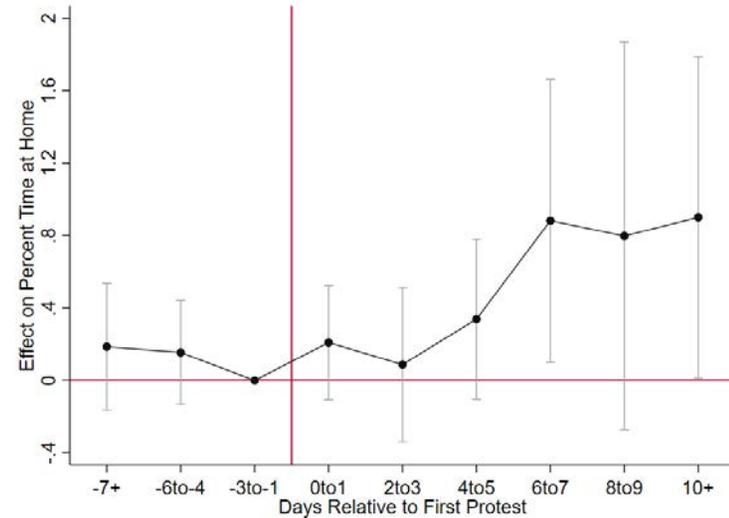
Note: Red dots represent cities that held a protest

**Figure 2. Event Studies Analysis of the Effects of Urban Protests on Social Distancing and COVID-19 Cases Growth**

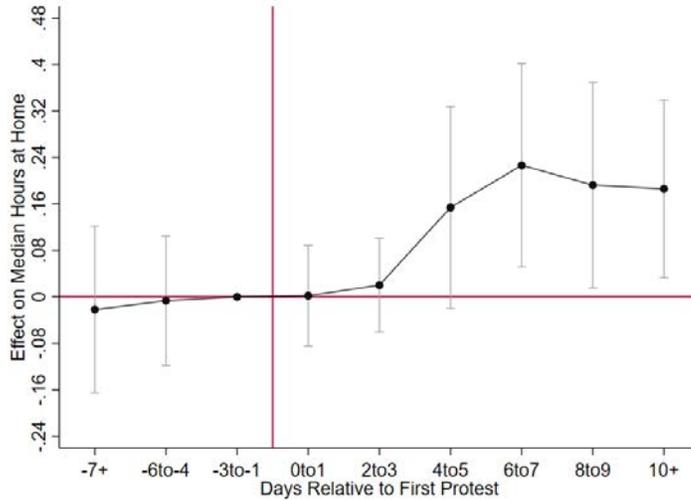
*Panel (a): Percent Staying at Home Full-Time*



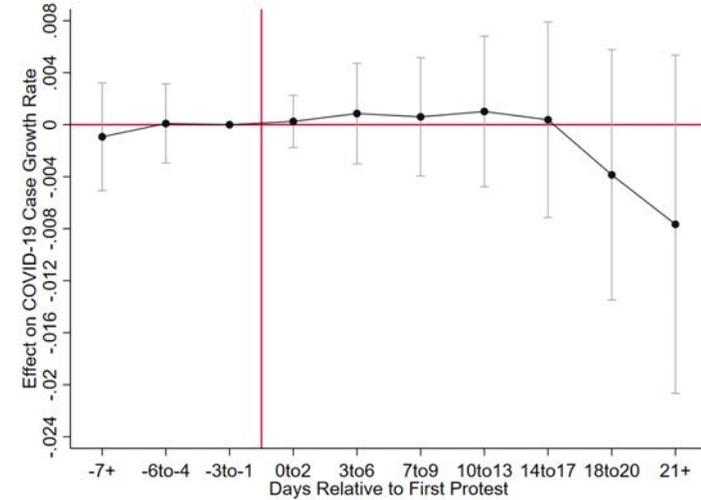
*Panel (b): Median Percent of Time at Home*



*Panel (c): Median Hours at Home*



*Panel (d): COVID-19 Case Growth Rate*



Notes: Estimate is generated using weighted least squares. All models include county and day fixed effects. State-level controls include: log testing rate, indicator for a SIPO, whether food industry reopened, whether retail store reopened, whether personal or pet care services reopened, and whether entertainment or activity reopened. County-level controls include: average temperature and an indicator for whether any precipitation fell.

**Table 1. Difference-in-Differences Estimates of the Effect of Urban Protests on Social Distancing**

	Stay-at-Home Full-Time		Median Percent Time Spent at Home		Median Hours Spent at Home	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel I: Primary Counties</i>						
0-1 Days After Protest	-0.040 (0.142)	0.072 (0.123)	0.118 (0.156)	0.177 (0.151)	-0.021 (0.040)	0.003 (0.037)
2-3 Days After Protest	-0.087 (0.169)	0.109 (0.159)	-0.064 (0.209)	0.061 (0.208)	-0.013 (0.041)	0.023 (0.041)
4-7 Days After Protest	0.490 (0.336)	0.703** (0.324)	0.322 (0.272)	0.460* (0.261)	0.132 (0.091)	0.175* (0.092)
8+ Days After Protest	0.265 (0.344)	0.575** (0.272)	0.347 (0.466)	0.551 (0.423)	0.096 (0.091)	0.158* (0.086)
N	6210	6210	6210	6210	6210	6210
<i>Panel II: Primary &amp; Secondary Counties</i>						
0-1 Days After Protest	-0.074 (0.137)	0.035 (0.119)	0.105 (0.151)	0.161 (0.146)	-0.024 (0.038)	-0.000 (0.036)
2-3 Days After Protest	-0.117 (0.164)	0.075 (0.154)	-0.073 (0.202)	0.048 (0.202)	-0.017 (0.039)	0.018 (0.039)
4-7 Days After Protest	0.437 (0.325)	0.637** (0.314)	0.320 (0.259)	0.447* (0.249)	0.121 (0.086)	0.161* (0.088)
8+ Days After Protest	0.192 (0.330)	0.476* (0.265)	0.313 (0.451)	0.493 (0.412)	0.084 (0.085)	0.138* (0.081)
N	7470	7470	7470	7470	7470	7470
Mean of DV	35.572	35.572	89.586	89.586	12.533	12.533
Observable Controls?	No	Yes	No	Yes	No	Yes

\* Significant at the 10% level, \*\* Significant at the 5% level, \*\*\* Significant at the 1% level

Notes: Estimate is generated using weighted least squares. All models include county and day fixed effects. State-level controls include: log testing rate, indicator for a SIPO, whether food industry reopened, whether retail store reopened, whether personal or pet care services reopened, and whether entertainment or activity reopened. County-level controls include: average temperature and an indicator for whether any precipitation fell. Standard errors, clustered at the county-level, are reported inside the parentheses.

**Table 2. Heterogeneity in the Effects of Urban Protests on Social Distancing**

	Stay-at-Home Full-Time		Median Percent Time Spent at Home		Median Hours Spent at Home	
	(1)		(2)		(3)	
	$T_c=1$	$T_c=0$	$T_c=1$	$T_c=0$	$T_c=1$	$T_c=0$
<i>Panel I: Cities with Violent Protests (<math>T_c=1</math>) vs. Cities with Peaceful Protests (<math>T_c=0</math>)</i>						
0-1 Days After Protest	0.144 (0.138)	-0.111 (0.163)	0.250 (0.179)	0.150 (0.171)	0.008 (0.044)	-0.020 (0.042)
2-3 Days After Protest	0.127 (0.194)	0.051 (0.194)	0.181 (0.230)	0.008 (0.206)	0.018 (0.046)	0.017 (0.061)
4-7 Days After Protest	0.723** (0.348)	0.432 (0.266)	0.527** (0.260)	0.168 (0.243)	0.176* (0.101)	0.132 (0.086)
8+ Days After Protest	0.504* (0.296)	0.324 (0.333)	0.601 (0.461)	0.212 (0.400)	0.149 (0.092)	0.093 (0.108)
<i>Panel II: Cities with Persistent Protests (<math>T_c=1</math>) vs. Cities with Temporary Protests (<math>T_c=0</math>)</i>						
0-1 Days After Protest	0.111 (0.128)	-0.148 (0.273)	0.168 (0.160)	0.429 (0.280)	0.006 (0.040)	-0.008 (0.060)
2-3 Days After Protest	0.125 (0.169)	0.056 (0.300)	0.108 (0.212)	0.050 (0.288)	0.022 (0.042)	0.047 (0.090)
4-7 Days After Protest	0.729** (0.341)	0.374 (0.353)	0.530** (0.261)	0.320 (0.359)	0.181* (0.100)	0.147 (0.105)
8+ Days After Protest	0.529* (0.280)	0.384 (0.394)	0.588 (0.427)	0.307 (0.489)	0.158* (0.092)	0.139 (0.137)

	Stay-at-Home Full-Time		Median Percent Time Spent at Home		Median Hours Spent at Home	
	(1)		(2)		(3)	
	T <sub>c</sub> =1	T <sub>c</sub> =0	T <sub>c</sub> =1	T <sub>c</sub> =0	T <sub>c</sub> =1	T <sub>c</sub> =0
<i>Panel III: Protest Cities with Size &gt;1,000 (T<sub>c</sub>=1) vs. Protest Cities with Size &lt;1,000 (T<sub>c</sub>=0)</i>						
0-1 Days After Protest	0.132 (0.159)	-0.026 (0.164)	0.278 (0.183)	0.104 (0.179)	-0.001 (0.044)	0.014 (0.039)
2-3 Days After Protest	0.194 (0.214)	-0.088 (0.161)	0.280 (0.246)	-0.242 (0.163)	0.031 (0.049)	0.011 (0.050)
4-7 Days After Protest	0.739** (0.353)	0.474* (0.253)	0.643** (0.267)	0.058 (0.217)	0.189* (0.101)	0.140* (0.078)
8+ Days After Protest	0.444 (0.269)	0.584** (0.292)	0.579 (0.399)	0.157 (0.389)	0.136 (0.083)	0.174* (0.102)
<i>Panel IV: Cities with a Curfew (T<sub>c</sub>=1) vs. Cities without a Curfew (T<sub>c</sub>=0)</i>						
0-1 Days After Protest	0.106 (0.146)	-0.024 (0.164)	0.233 (0.174)	0.142 (0.197)	0.008 (0.043)	-0.012 (0.040)
2-3 Days After Protest	0.137 (0.202)	-0.043 (0.187)	0.224 (0.237)	-0.213 (0.188)	0.030 (0.048)	-0.011 (0.046)
4-7 Days After Protest	0.707** (0.345)	0.447* (0.248)	0.597** (0.259)	0.039 (0.212)	0.180* (0.096)	0.110 (0.078)
8+ Days After Protest	0.334 (0.267)	0.785*** (0.294)	0.432 (0.407)	0.436 (0.385)	0.098 (0.084)	0.213** (0.098)
N	6210		6210		6210	
Mean of DV	35.572		89.586		12.533	

\* Significant at the 10% level, \*\* Significant at the 5% level, \*\*\* Significant at the 1% level

Notes: Estimate is generated using weighted least squares. All models include county and day fixed effects. State-level controls include: log testing rate, indicator for a SIPO, whether food industry reopened, whether retail store reopened, whether personal or pet care services reopened, and whether entertainment or activity reopened. County-level controls include: average temperature and an indicator for whether any precipitation fell. Standard errors, clustered at the county-level, are reported inside the parentheses.

**Table 3. Difference-in-Differences Estimates of the Effect of Urban Protests on COVID-19 Case Growth**

	(1)	(2)
<i>Panel I: Primary Counties</i>		
0-2 Days After Protest	-0.00004 (0.0010)	0.0003 (0.0011)
3-6 Days After Protest	0.0005 (0.0021)	0.0009 (0.0022)
7-9 Days After Protest	-0.0006 (0.0025)	0.0006 (0.0025)
10-13 Days After Protest	-0.0003 (0.0032)	0.0010 (0.0031)
14-17 Days After Protest	-0.0013 (0.0041)	0.0003 (0.0039)
18-20 Days After Protest	-0.0062 (0.0051)	-0.0039 (0.0049)
21+ Days After Protest	-0.0107 (0.0071)	-0.0078 (0.0066)
N	7659	7659
Observable Controls?	No	Yes
<i>Panel II: Primary &amp; Secondary Counties</i>		
0-2 Days After Protest	-0.0001 (0.0010)	0.0003 (0.0011)
3-6 Days After Protest	0.0007 (0.0020)	0.0010 (0.0021)
7-9 Days After Protest	-0.0006 (0.0024)	0.0007 (0.0023)
10-13 Days After Protest	-0.00004 (0.0029)	0.0013 (0.0029)
14-17 Days After Protest	-0.0009 (0.0038)	0.0007 (0.0036)
18-20 Days After Protest	-0.0055 (0.0048)	-0.0033 (0.0046)
21+ Days After Protest	-0.0103 (0.0067)	-0.0075 (0.0063)
N	9213	9213
Observable Controls?	No	Yes

---

*Panel III: Heterogenous Effects by Protest Characteristics*

$T_c=1$

$T_c=0$

*(a): Cities with Violent Protests ( $T_c=1$ ) vs Cities Peaceful Protests ( $T_c=0$ )*

0-2 Days After Protest	-0.0004 (0.0010)	0.0017 (0.0021)
3-6 Days After Protest	0.0006 (0.0023)	0.0011 (0.0026)
7-9 Days After Protest	0.00002 (0.0026)	0.0020 (0.0031)
10-13 Days After Protest	0.0006 (0.0032)	0.0028 (0.0038)
14-17 Days After Protest	0.0001 (0.0039)	0.0035 (0.0046)
18-20 Days After Protest	-0.0037 (0.0049)	0.0017 (0.0057)
21+ Days After Protest	-0.0058 (0.0066)	-0.0101 (0.0066)

*(b): Cities with Persistent Protests ( $T_c=1$ ) vs Cities with Temporary Protests ( $T_c=0$ )*

0-2 Days After Protest	0.0004 (0.0011)	-0.0008 (0.0023)
3-6 Days After Protest	0.0008 (0.0023)	-0.0006 (0.0029)
7-9 Days After Protest	0.0003 (0.0026)	-0.0006 (0.0034)
10-13 Days After Protest	0.0003 (0.0032)	0.0027 (0.0051)
14-17 Days After Protest	0.0002 (0.0040)	0.0004 (0.0055)
18-20 Days After Protest	-0.0040 (0.0050)	-0.0022 (0.0071)
21+ Days After Protest	-0.0075 (0.0067)	-0.0150* (0.0081)

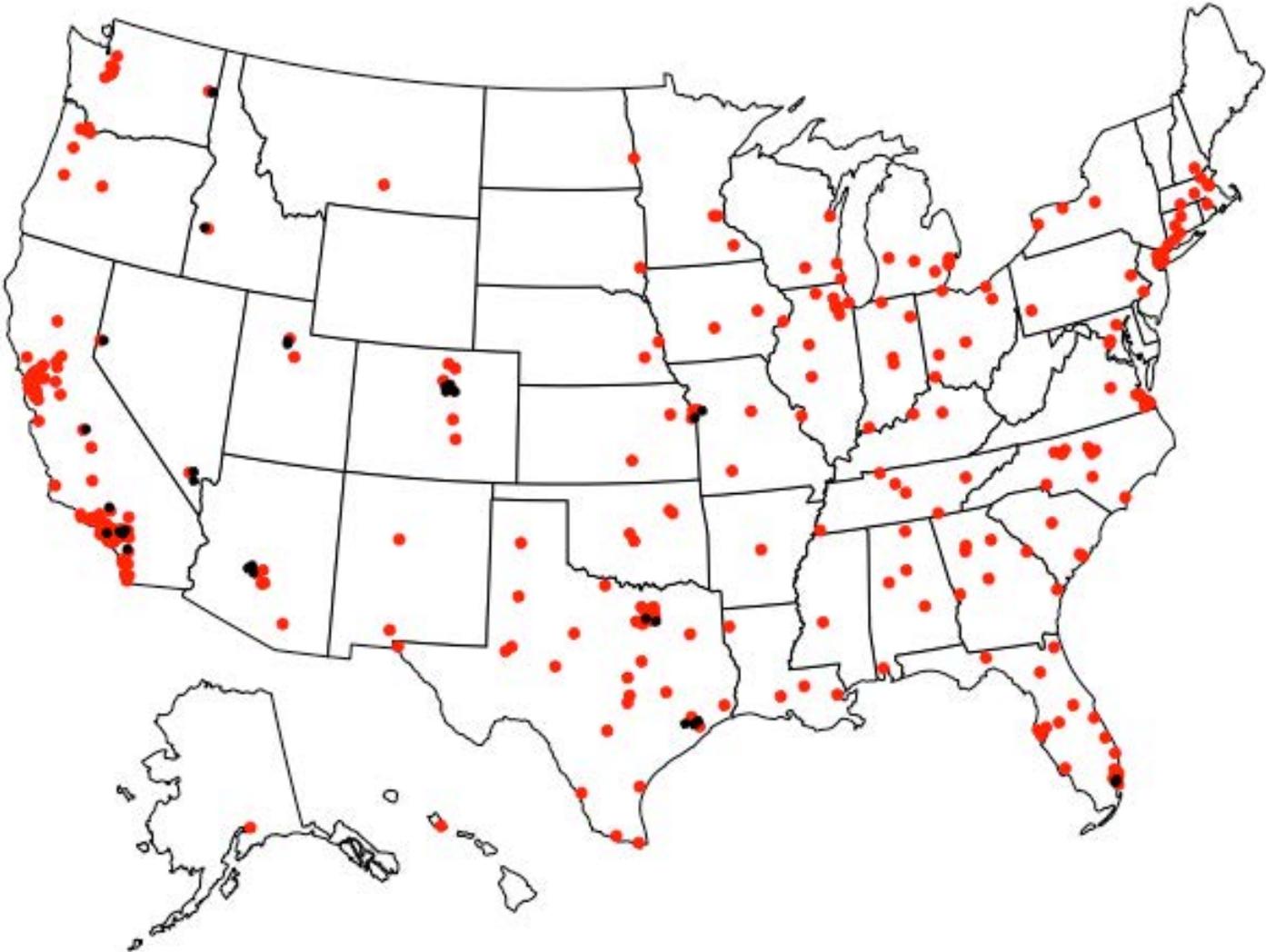
---

	T <sub>c</sub> =1	T <sub>c</sub> =0
<i>(c): Protest Cities with Size ≥1,000 (T<sub>c</sub>=1) vs. Protest Cities with Size &lt;1,000 (T<sub>c</sub>=0)</i>		
0-2 Days After Protest	-0.0001 (0.0010)	0.0006 (0.0016)
3-6 Days After Protest	0.0009 (0.0021)	0.0002 (0.0025)
7-9 Days After Protest	-0.00002 (0.0025)	0.0005 (0.0030)
10-13 Days After Protest	-0.0003 (0.0032)	0.0026 (0.0036)
14-17 Days After Protest	-0.0002 (0.0040)	0.0018 (0.0044)
18-20 Days After Protest	-0.0044 (0.0050)	-0.0009 (0.0053)
21+ Days After Protest	-0.0071 (0.0067)	-0.0060 (0.0062)
<i>(d): Cities with a Curfew (T<sub>c</sub>=1) vs. Cities without a Curfew (T<sub>c</sub>=0)</i>		
0-2 Days After Protest	-0.0001 (0.0010)	0.0005 (0.0017)
3-6 Days After Protest	0.0005 (0.0021)	0.0007 (0.0024)
7-9 Days After Protest	-0.0001 (0.0025)	0.0011 (0.0029)
10-13 Days After Protest	-0.0001 (0.0032)	0.0027 (0.0035)
14-17 Days After Protest	-0.0001 (0.0040)	0.0020 (0.0043)
18-20 Days After Protest	-0.0038 (0.0050)	-0.0026 (0.0053)
21+ Days After Protest	-0.0082 (0.0066)	-0.0032 (0.0076)
N		7659
Mean of DV		0.0186

\* Significant at the 10% level, \*\* Significant at the 5% level, \*\*\* Significant at the 1% level

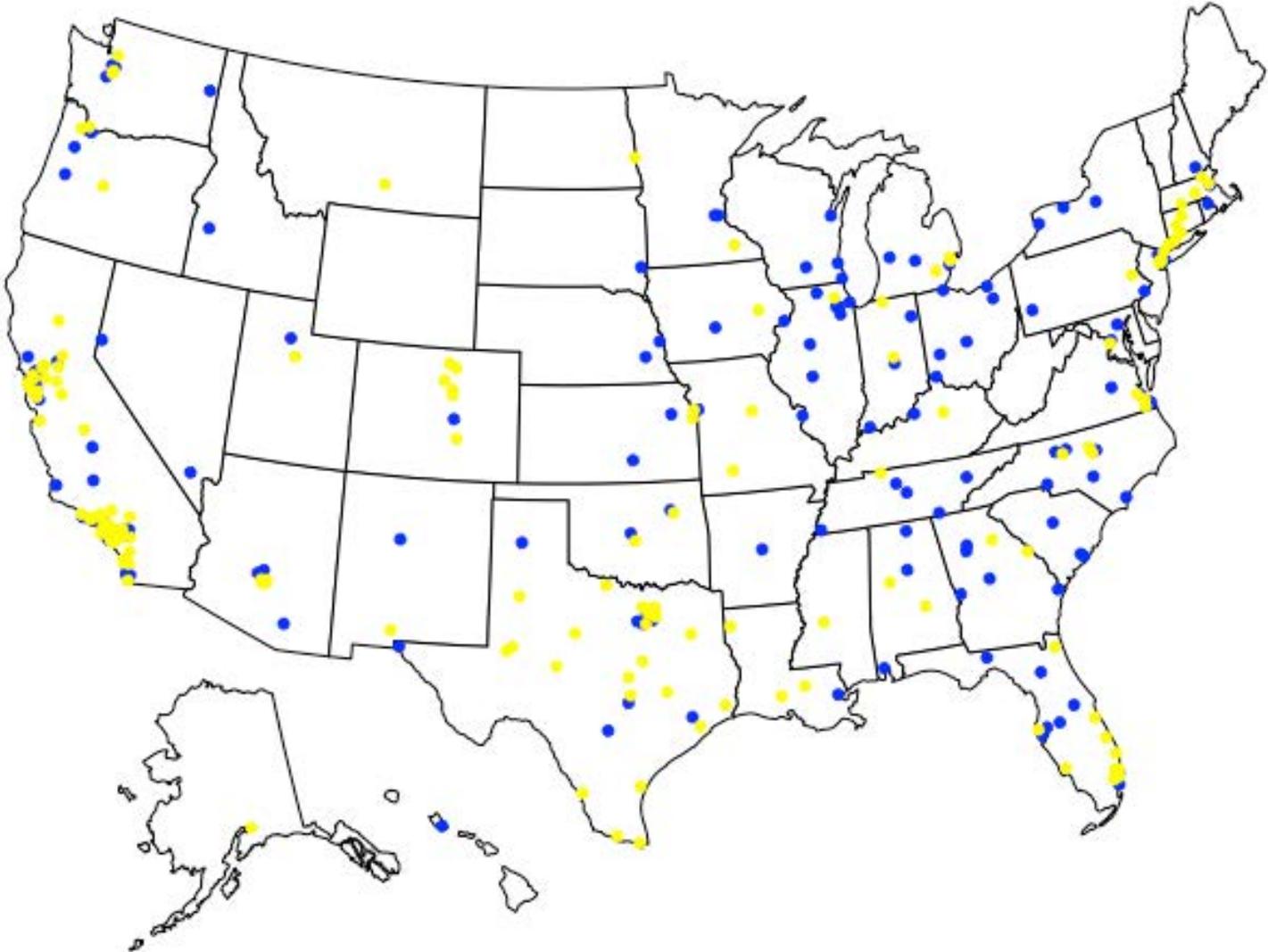
Notes: Estimate is generated using weighted least squares. All models include county and day fixed effects. State-level controls include: log testing rate, indicator for a SIPO, whether food industry reopened, whether retail store reopened, whether personal or pet care services reopened, and whether entertainment or activity reopened. County-level controls include: average temperature and an indicator for whether any precipitation fell. Panel III includes the full set of controls. Standard errors, clustered at the county-level, are reported inside the parentheses.

**Appendix Figure 1: Distribution of Large U.S. Cities with and without Protests**



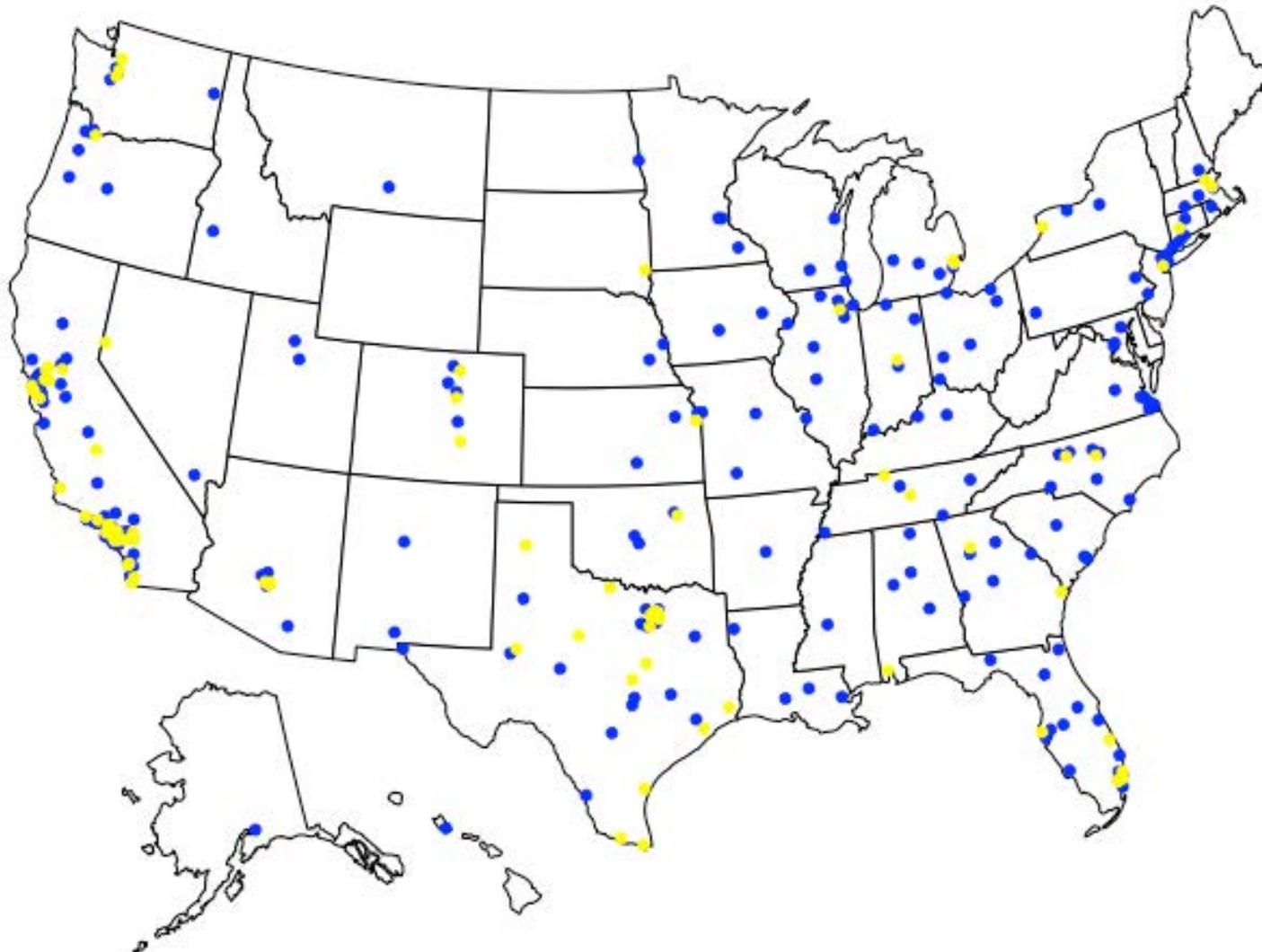
Note: Red dots represent cities with a protests. Black dots represent cities with >100,000 population and without a protest.

**Appendix Figure 2. Distribution of Large Cities with Protests, by Whether Accompanied by Media Reports of Violence**



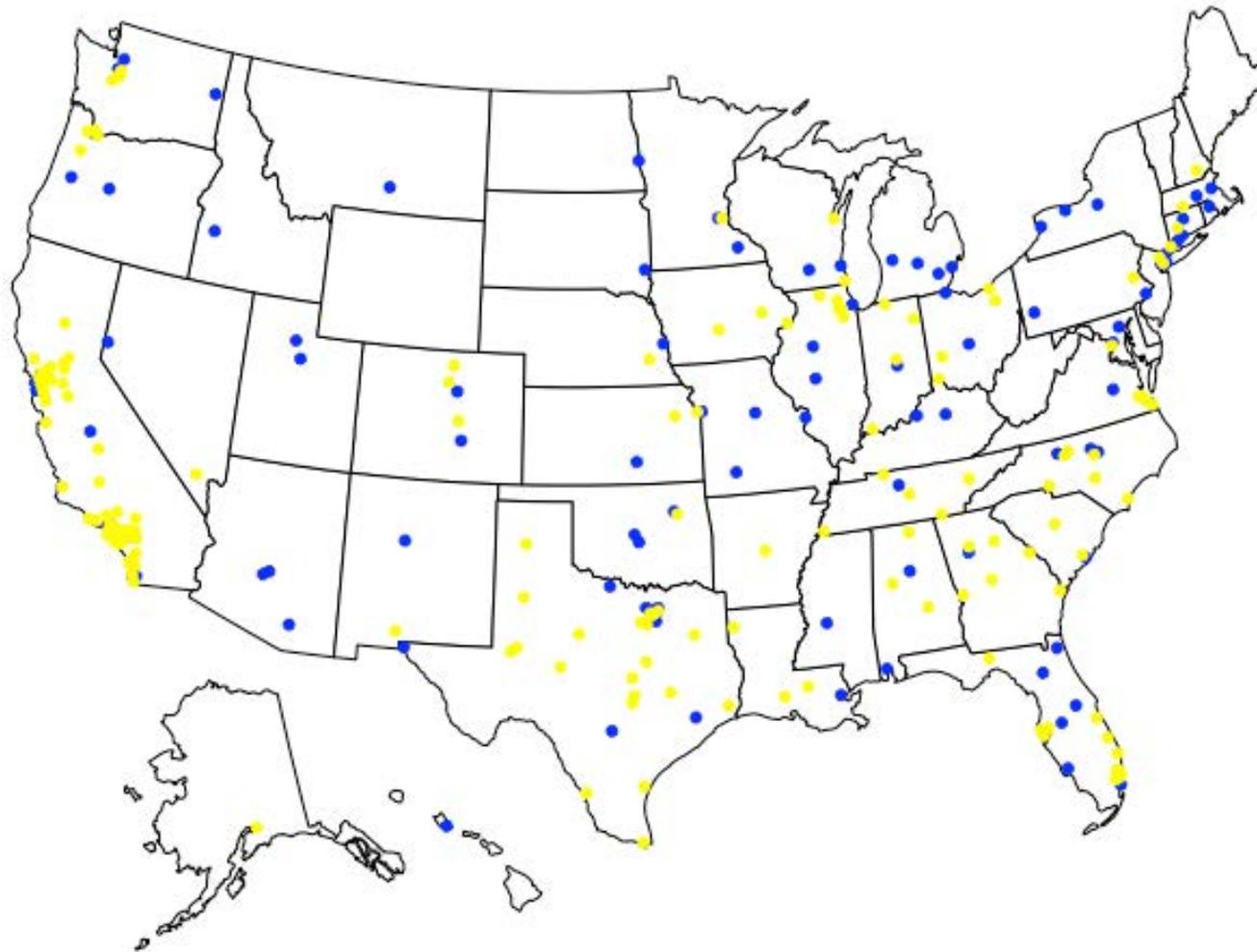
Note: Blue dots represent cities with protests that were accompanied by mainstream media reports of violence. Yellow dots represent cities with protests that were consistently described as peaceful.

**Appendix Figure 3. Distribution of Large Cities with Protests, by Whether Protest was Persistent**



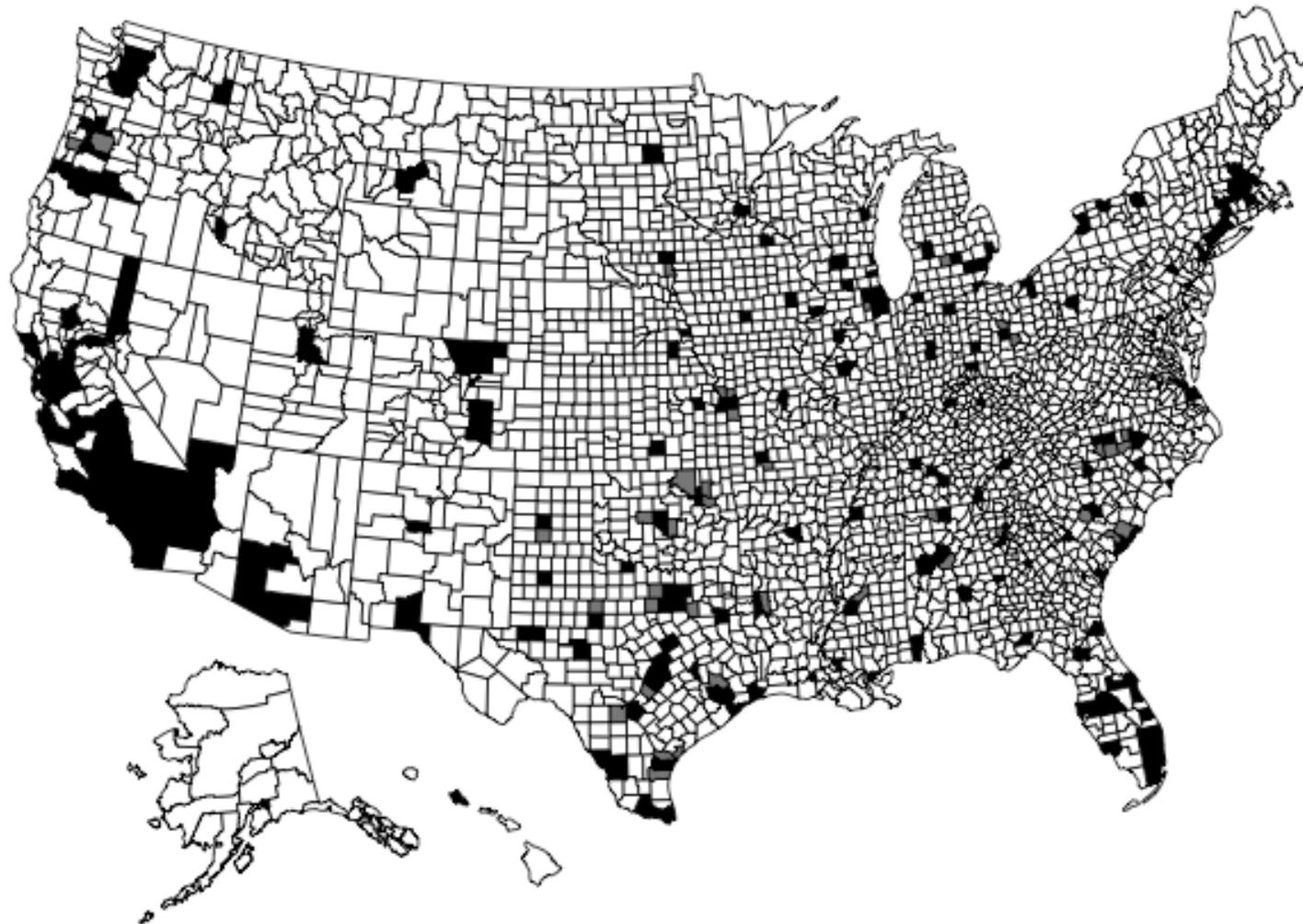
Note: Blue dots represent cities with protests that persisted for three or more days. Yellow dots represent cities with protests that only persisted for one or two days.

**Appendix Figure 4. Distribution of Large Cities with Protests, by Whether Protest Attracted at Least 1,000 Protesters**



Note: Blue dots represent cities with protests with crowds of over 1,000 people. Yellow dots represent cities with protests with crowds of less than 1,000 people.

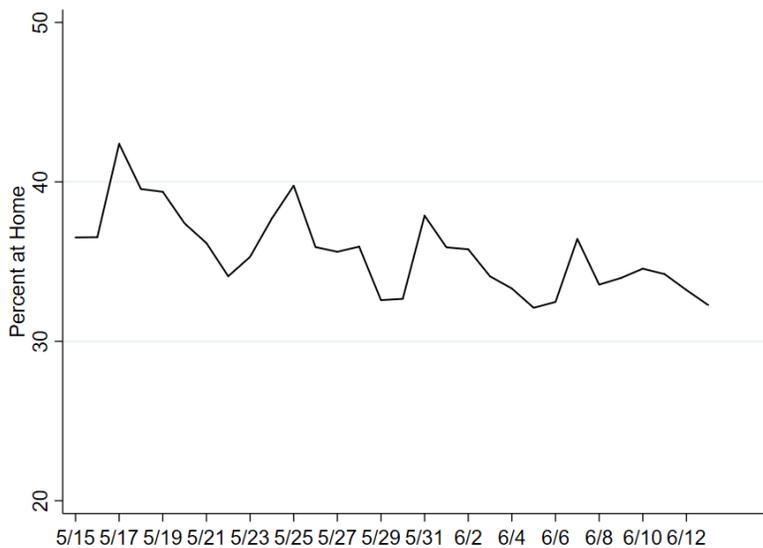
**Appendix Figure 5. Distribution of Counties with at Least One Large Urban Protest**



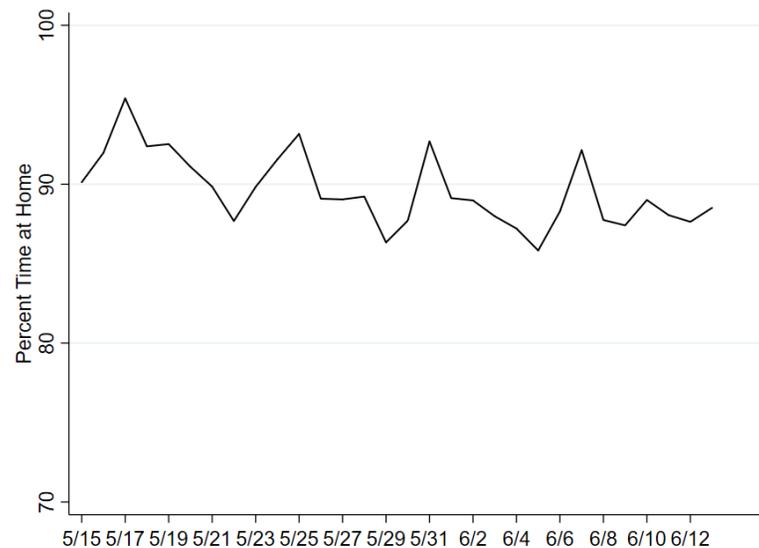
Note: Black shaded counties represent primary counties with a protest. Gray shaded counties represent secondary counties with a protest.

## Appendix Figure 6. Trends in Social Distancing and COVID-19 Cases

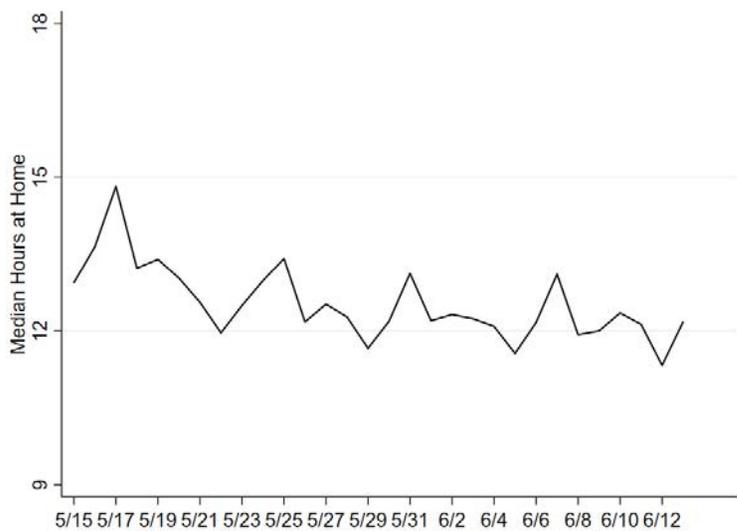
Panel (a): Stay-at-Home Full-Time



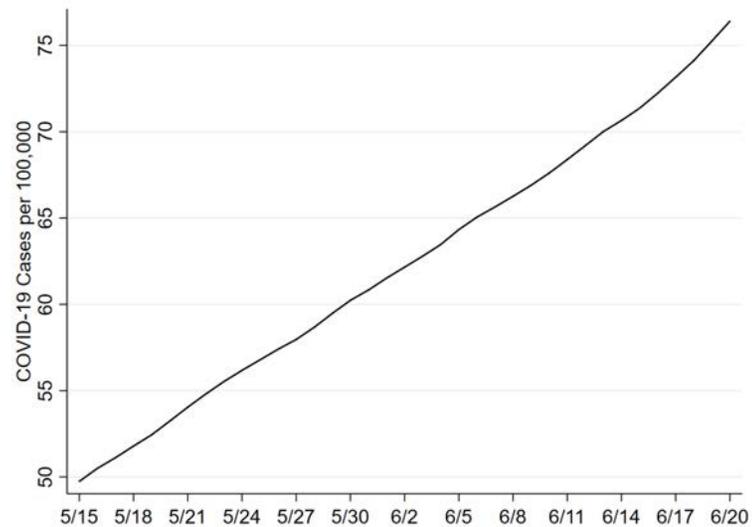
Panel (b): Median Percent Time Spent at Home



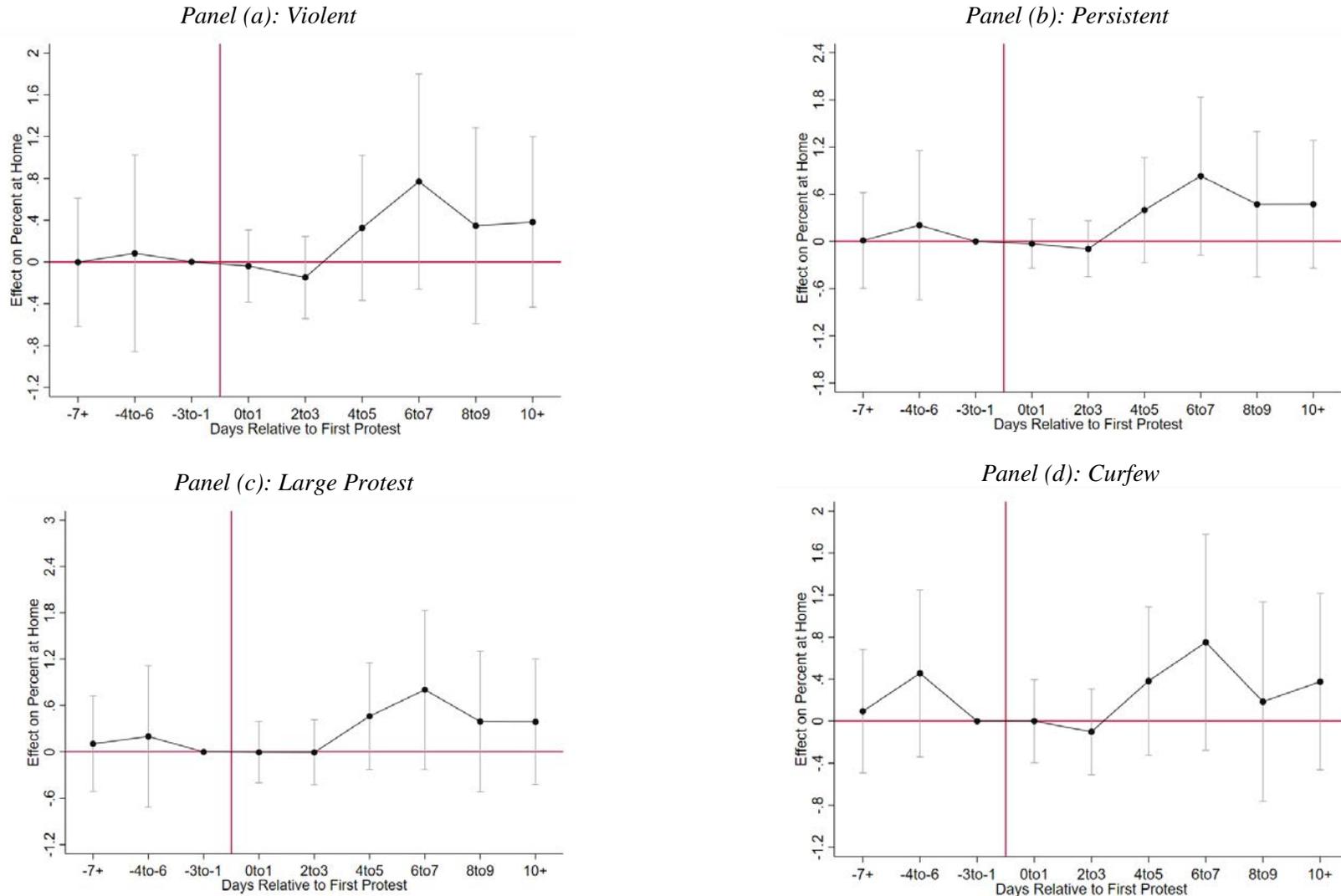
Panel (c): Median Hours at Home



Panel (d): COVID-19 Cases per 100,000

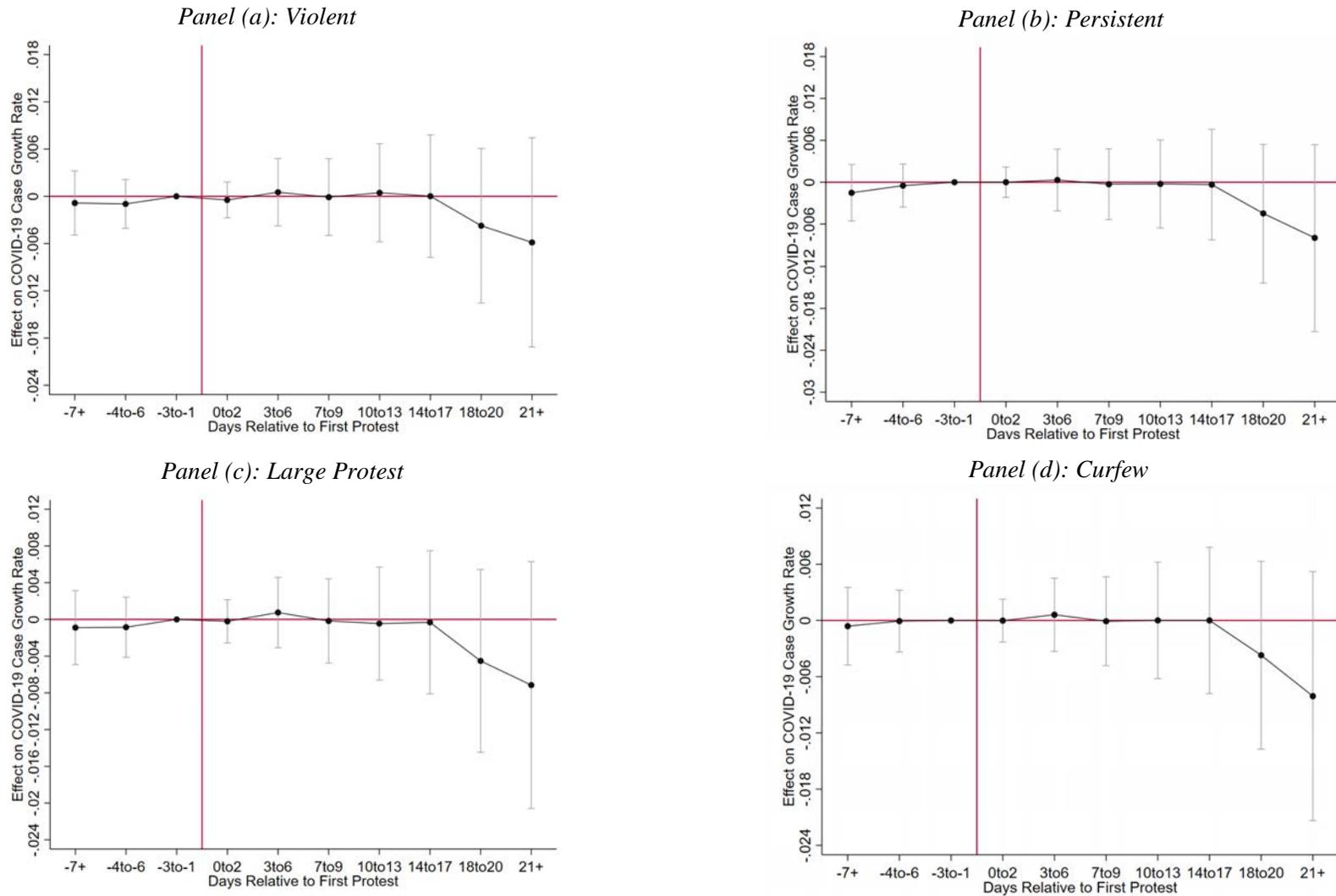


**Appendix Figure 7. Event-Study Analysis of Effect of Urban Protests on % Stay at Home Full-Time, by Protest Characteristics**



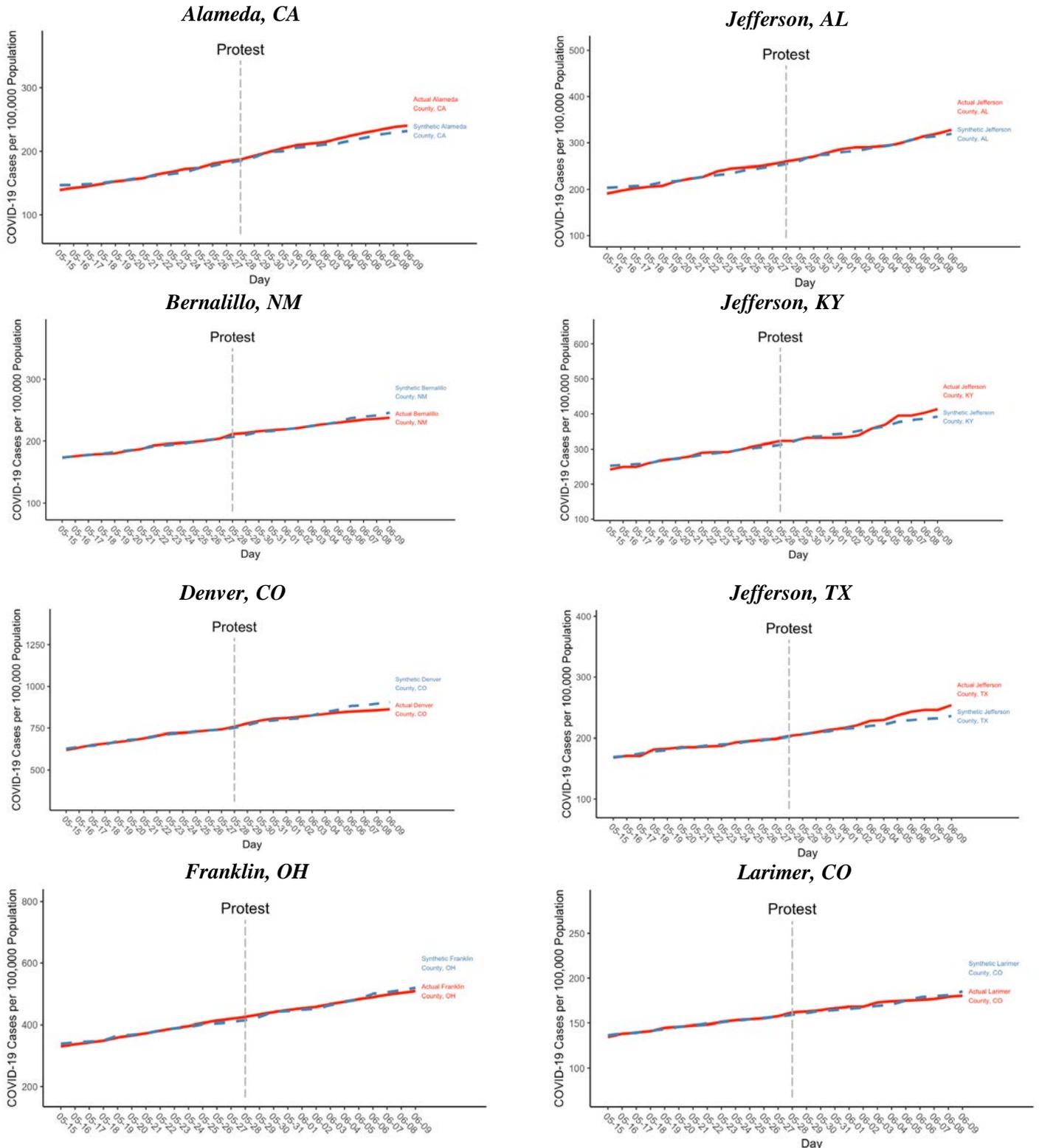
Notes: Estimate is generated using weighted least squares. All models include county and day fixed effects. State-level controls include: log testing rate, indicator for a SIPO, whether food industry reopened, whether retail store reopened, whether personal or pet care services reopened, and whether entertainment or activity reopened. County-level controls include: average temperature and an indicator for whether any precipitation fell.

**Appendix Figure 8. Event-Study Analysis of Urban Protests on COVID-19 Case Growth Rate, by Characteristics of Protest**



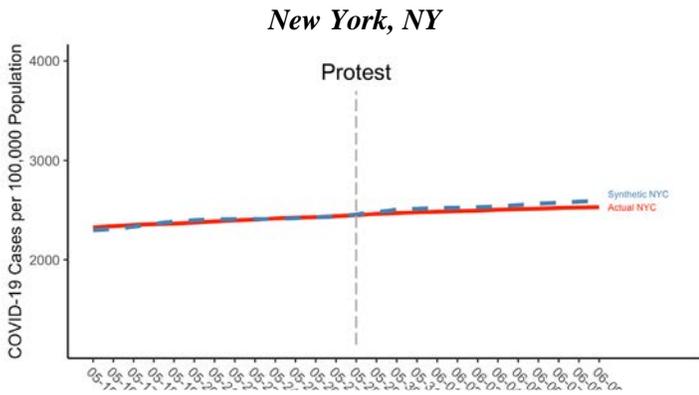
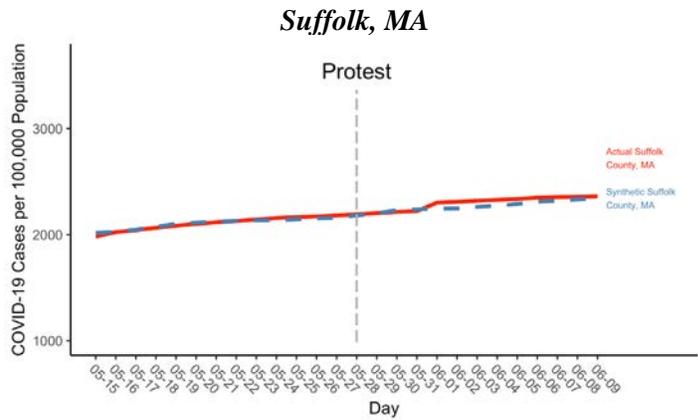
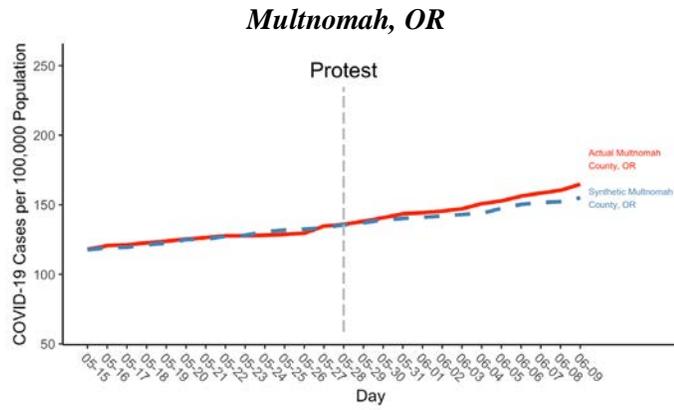
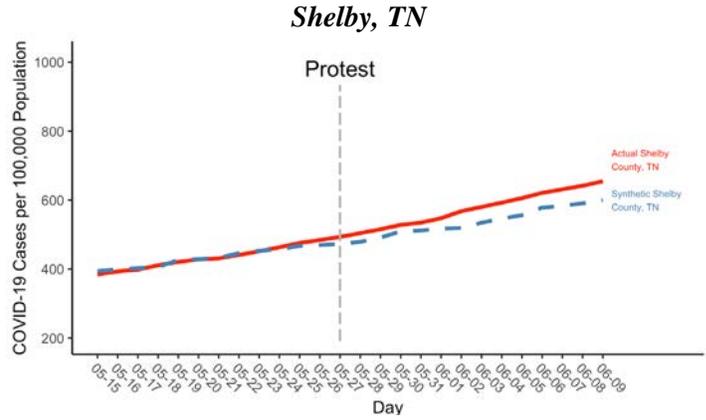
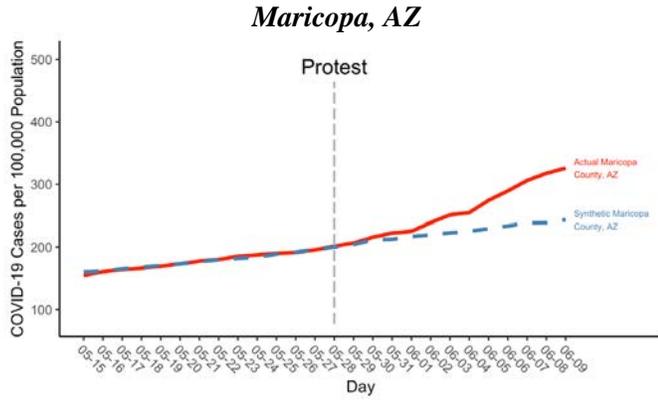
Notes: Estimate is generated using weighted least squares. All models include county and day fixed effects. State-level controls include: log testing rate, indicator for a SIPO, whether food industry reopened, whether retail store reopened, whether personal or pet care services reopened, and whether entertainment or activity reopened. County-level controls include: average temperature and an indicator for whether any precipitation fell.

**Appendix Figure 9. Synthetic Control Estimates of Effects of Urban Protests on COVID-19 Cases Per 100,000 Population for Selected Counties with Early Protest and Strong Pre-trend Match (May 28 or Earlier)**



Note: Estimate is generated using synthetic control method matching on each pre-protest day of COVID-19 cases. The donor pool consists of counties where no large (100,000 population) city held a protest or where such a protest took place June 4 or later.

Appendix Figure 9. Continued



Note: Estimate is generated using synthetic control method matching on each pre-protest day of COVID-19 cases. The donor pool consists of counties where no large (100,000 population) city held a protest or where such a protest took place June 4 or later.

**Appendix Table 1. Sensitivity of Difference-in-Differences Estimates of Urban Protests on Social Distancing to Controls for County-Specific Linear Time Trends**

	Stay-at-Home Full-Time	Median Percent Time Spent at Home	Median Hours at Home
	(1)	(2)	(3)
0-1 Days After Protest	0.008 (0.162)	0.143 (0.184)	-0.016 (0.039)
2-3 Days After Protest	-0.003 (0.173)	-0.027 (0.299)	-0.013 (0.060)
4-7 Days After Protest	0.524 (0.469)	0.299 (0.401)	0.114 (0.143)
8+ Days After Protest	0.216 (0.501)	0.198 (0.629)	0.043 (0.170)
N	6210	6210	6210
Controls	Yes	Yes	Yes

\* Significant at the 10% level, \*\* Significant at the 5% level, \*\*\* Significant at the 1% level

Notes: Estimate is generated using weighted least squares. All models include county and day fixed effects as well as county specific linear time trends. State-level controls include: log testing rate, indicator for a SIPO, whether food industry reopened, whether retail store reopened, whether personal or pet care services reopened, and whether entertainment or activity reopened. County-level controls include: average temperature and an indicator for whether any precipitation fell. Standard errors, clustered at the county-level, are reported inside the parentheses.

**Appendix Table 2. Sensitivity of Difference-in-Differences Estimates of Urban Protests on Social Distancing to Inclusion of Border Counties**

	Stay-at-Home Full-Time	Median Percent Time Spent at Home	Median Hours at Home
	(1)	(2)	(3)
0-1 Days After Protest	0.017 (0.143)	0.306 (0.223)	0.029 (0.054)
2-3 Days After Protest	-0.076 (0.164)	-0.031 (0.178)	0.024 (0.044)
4-7 Days After Protest	0.477* (0.286)	0.445* (0.250)	0.143* (0.074)
8+ Days After Protest	0.231 (0.275)	0.409 (0.392)	0.131* (0.070)
N	29430	29430	29430
Controls	Yes	Yes	Yes

\* Significant at the 10% level, \*\* Significant at the 5% level, \*\*\* Significant at the 1% level

Notes: Estimate is generated using weighted least squares. All models include county and day fixed effects. State-level controls include: log testing rate, indicator for a SIPO, whether food industry reopened, whether retail store reopened, whether personal or pet care services reopened, and whether entertainment or activity reopened. County-level controls include: average temperature and an indicator for whether any precipitation fell. Standard errors, clustered at the primary treatment county-level, are reported inside the parentheses.

**Appendix Table 3. Heterogeneity in the Effects of Urban Protests on Social Distancing**

	Stay-at-Home Full-Time		Median Percent Time Spent at Home		Median Hours at Home	
	(1)		(2)		(3)	
	$T_c=1$	$T_c=0$	$T_c=1$	$T_c=0$	$T_c=1$	$T_c=0$
<i>Panel I: Cities with Protest on May 28 or Before (<math>T_c=1</math>) vs. Cities with Protest After May 28 (<math>T_c=0</math>)</i>						
0-1 Days After Protest	0.427** (0.200)	0.023 (0.158)	0.677** (0.267)	0.113 (0.158)	0.044 (0.059)	0.005 (0.036)
2-3 Days After Protest	0.187 (0.418)	0.158 (0.175)	0.695 (0.538)	-0.134 (0.130)	0.112 (0.114)	-0.001 (0.040)
4-7 Days After Protest	1.510*** (0.398)	0.328** (0.156)	1.109*** (0.280)	0.050 (0.169)	0.304*** (0.106)	0.085 (0.055)
8+ Days After Protest	0.542 (0.405)	0.244 (0.219)	0.772*** (0.270)	0.049 (0.255)	0.108* (0.064)	0.090 (0.074)
<i>Panel II: Cities with Population <math>\geq 500K</math> (<math>T_c=1</math>) vs. Cities with Population <math>&lt; 500K</math> (<math>T_c=0</math>)</i>						
0-1 Days After Protest	0.028 (0.215)	0.070 (0.146)	0.229 (0.250)	0.323* (0.166)	-0.001 (0.043)	0.020 (0.047)
2-3 Days After Protest	0.034 (0.277)	0.085 (0.183)	0.338 (0.372)	0.047 (0.158)	-0.024 (0.063)	0.070 (0.054)
4-7 Days After Protest	0.774* (0.419)	0.494** (0.228)	0.892*** (0.297)	0.160 (0.191)	0.237** (0.115)	0.147* (0.075)
8+ Days After Protest	0.205 (0.289)	0.523* (0.278)	0.515 (0.403)	0.246 (0.365)	0.125 (0.081)	0.152 (0.098)

	Stay-at-Home Full-Time		Median Percent Time Spent at Home		Median Hours at Home	
	(1)		(2)		(3)	
	T <sub>c</sub> =1	T <sub>c</sub> =0	T <sub>c</sub> =1	T <sub>c</sub> =0	T <sub>c</sub> =1	T <sub>c</sub> =0
<i>Panel III: Counties with <math>\geq</math> Mean Share of Non-Hispanic Whites (T<sub>c</sub>=1) vs. Counties with <math>&lt;</math> Mean Share of Non-Hispanic Whites (T<sub>c</sub>=0)</i>						
0-1 Days After Protest	0.252 (0.186)	-0.055 (0.148)	0.273 (0.180)	0.149 (0.187)	-0.007 (0.046)	0.001 (0.041)
2-3 Days After Protest	0.198 (0.194)	0.057 (0.200)	-0.103 (0.167)	0.222 (0.267)	0.073 (0.050)	-0.021 (0.049)
4-7 Days After Protest	0.534** (0.255)	0.788** (0.360)	-0.027 (0.219)	0.753*** (0.262)	0.185** (0.075)	0.161 (0.103)
8+ Days After Protest	0.939*** (0.335)	0.320 (0.267)	0.504 (0.404)	0.462 (0.405)	0.259*** (0.098)	0.098 (0.085)
N	6210		6210		6210	
Mean of DV	35.572		89.586		12.533	

\* Significant at the 10% level, \*\* Significant at the 5% level, \*\*\* Significant at the 1% level

Notes: Estimate is generated using weighted least squares. All models include county and day fixed effects. State-level controls include: log testing rate, indicator for a SIPO, whether food industry reopened, whether retail store reopened, whether personal or pet care services reopened, and whether entertainment or activity reopened. County-level controls include: average temperature and an indicator for whether any precipitation fell. Standard errors, clustered at the county-level, are reported inside the parentheses.

**Appendix Table 4. Sensitivity of Difference-in-Differences Estimates of Urban Protests on Cases to Inclusion of Border Counties**

	(1)
0-2 Days After Protest	-0.0002 (0.0011)
3-6 Days After Protest	0.0006 (0.0020)
7-9 Days After Protest	0.0011 (0.0023)
10-13 Days After Protest	0.0012 (0.0027)
14-17 Days After Protest	0.0002 (0.0034)
18-20 Days After Protest	-0.0037 (0.0043)
21+ Days After Protest	-0.0084 (0.0057)
N	335562

\* Significant at the 10% level, \*\* Significant at the 5% level, \*\*\* Significant at the 1% level

Notes: Estimate is generated using weighted least squares. All models include county and day fixed effects. State-level controls include: log testing rate, indicator for a SIPO, whether food industry reopened, whether retail store reopened, whether personal or pet care services reopened, and whether entertainment or activity reopened. County-level controls include: average temperature and an indicator for whether any precipitation fell. Standard errors, clustered at the primary treatment county-level, are reported inside the parentheses.

**Appendix Table 5. Sensitivity of Difference-in-Differences Estimates of Urban Protests on Cases to Controls for County-Specific Linear Time Trends**

	(1)
0-2 Days After Protest	0.0003 (0.0011)
3-6 Days After Protest	0.0009 (0.0022)
7-9 Days After Protest	0.0006 (0.0025)
10-13 Days After Protest	0.0010 (0.0031)
14-17 Days After Protest	0.0003 (0.0039)
18-20 Days After Protest	-0.0039 (0.0049)
21+ Days After Protest	-0.0078 (0.0066)
N	7659

\* Significant at the 10% level, \*\* Significant at the 5% level, \*\*\* Significant at the 1% level

Notes: Estimate is generated using weighted least squares. All models include county and day fixed effects, as well as county-specific linear time trend. State-level controls include: log testing rate, indicator for a SIPO, whether food industry reopened, whether retail store reopened, whether personal or pet care services reopened, and whether entertainment or activity reopened. County-level controls include: average temperature and an indicator for whether any precipitation fell. Standard errors, clustered at the county-level, are reported inside the parentheses.

**Appendix Table 6. Heterogeneity in the Effects of Urban Protests on Case Growth Rate**

	(1) $T_c=1$	(2) $T_c=0$
<i>Panel I: Cities with Protest on May 28 or Before (<math>T_c=1</math>) vs. Cities with Protest After May 28 (<math>T_c=0</math>)</i>		
0-2 Days After Protest	0.0002 (0.0019)	0.0004 (0.0014)
3-6 Days After Protest	0.0018 (0.0030)	0.0005 (0.0021)
7-9 Days After Protest	0.0004 (0.0039)	0.0003 (0.0029)
10-13 Days After Protest	0.0009 (0.0044)	0.0007 (0.0035)
14-17 Days After Protest	-0.0003 (0.0049)	0.0004 (0.0044)
18-20 Days After Protest	-0.0033 (0.0065)	-0.0045 (0.0055)
21+ Days After Protest	-0.0088 (0.0074)	-0.0074 (0.0069)
<i>Panel II: Cities with Population <math>\geq 500K</math> (<math>T_c=1</math>) vs. Cities with Population <math>&lt; 500K</math> (<math>T_c=0</math>)</i>		
0-2 Days After Protest	0.0008 (0.0012)	0.0002 (0.0015)
3-6 Days After Protest	0.0020 (0.0022)	-0.0002 (0.0024)
7-9 Days After Protest	0.0009 (0.0025)	-0.0008 (0.0029)
10-13 Days After Protest	-0.0000 (0.0035)	0.0006 (0.0035)
14-17 Days After Protest	-0.0001 (0.0042)	-0.0000 (0.0044)
18-20 Days After Protest	-0.0042 (0.0053)	-0.0039 (0.0053)
21+ Days After Protest	-0.0062 (0.0070)	-0.0115* (0.0061)

	(1) T <sub>c</sub> =1	(2) T <sub>c</sub> =0
<i>Panel III: Counties with <math>\geq</math> Mean Share of Non-Hispanic Whites (T<sub>c</sub>=1) vs. Counties with <math>&lt;</math> Mean Share of Non-Hispanic Whites (T<sub>c</sub>=0)</i>		
0-2 Days After Protest	0.0002 (0.0015)	0.0003 (0.0013)
3-6 Days After Protest	0.0004 (0.0024)	0.0011 (0.0023)
7-9 Days After Protest	0.0011 (0.0031)	0.0003 (0.0027)
10-13 Days After Protest	0.0004 (0.0038)	0.0014 (0.0032)
14-17 Days After Protest	0.0001 (0.0050)	0.0004 (0.0039)
18-20 Days After Protest	-0.0044 (0.0064)	-0.0039 (0.0050)
21+ Days After Protest	-0.0045 (0.0105)	-0.0092 (0.0063)
N		7659
Mean of DV		0.0186

\* Significant at the 10% level, \*\* Significant at the 5% level, \*\*\* Significant at the 1% level

Notes: Estimate is generated using weighted least squares. All models include county and day fixed effects. State-level controls include: log testing rate, indicator for a SIPO, whether food industry reopened, whether retail store reopened, whether personal or pet care services reopened, and whether entertainment or activity reopened. County-level controls include: average temperature and an indicator for whether any precipitation fell. Standard errors, clustered at the county-level, are reported inside the parentheses.

**Appendix Table 7. Comparisons of Estimates for Early, Later, and Never-Protest Counties**

	(1) Pooled	(2) Early v. Never	(3) Late v. Never	(4) Early v. Late
0-5 Days After Protest	0.0005 (0.0013)	-0.0026 (0.0030)	0.0007 (0.0015)	0.0006 (0.0021)
6-13 Days After Protest	0.0009 (0.0019)	-0.0010 (0.0052)	0.0011 (0.0024)	0.0004 (0.0041)
14-20 Days After Protest	-0.0001 (0.0028)	-0.0067 (0.0079)	0.0008 (0.0036)	-0.0014 (0.0052)
21+ Days After Protest	-0.0044 (0.0045)	-0.0103 (0.0083)	-0.0030 (0.0050)	-0.0039 (0.0072)
N	7659	888	6993	7437

\* Significant at the 10% level, \*\* Significant at the 5% level, \*\*\* Significant at the 1% level

Notes: Estimate is generated using weighted least squares. All models include county and day fixed effects. State-level controls include: log testing rate, indicator for a SIPO, whether food industry reopened, whether retail store reopened, whether personal or pet care services reopened, and whether entertainment or activity reopened. County-level controls include: average temperature and an indicator for whether any precipitation fell. Standard errors, clustered at the county-level, are reported inside the parenthesis. Counties with first protest on May 28 or before are coded as Early protest county. Counties with first protest on May 29 or after are coded as Late protest county.