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EFFECTS OF COVID-19 SHUTDOWNS ON DOMESTIC VIOLENCE IN US CITIES

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ABSTRACT

We empirically investigate the impact of COVID-19 shutdowns on domestic violence using incident-level data on both domestic-related calls for service and crime reports of domestic violence assaults from the 18 major US police departments for which both types of records are available. Although we confirm prior reports of an increase in domestic calls for service at the start of the pandemic, we find that the increase preceded mandatory shutdowns, and there was an incremental decline following the government imposition of restrictions. We find no evidence that domestic violence crimes increased. Rather, domestic violence assaults declined significantly during the initial shutdown period and there was no significant change in intimate partner homicides in these months. Our results fail to support claims that shutdowns increased domestic violence and suggest caution before drawing inference or basing policy on calls data alone.

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1. INTRODUCTION

From the outset of the COVID-19 pandemic, news coverage and policymaking have prominently featured concerns that government-mandated restrictions on economic activity and personal mobility might increase domestic violence (DV).[1] This attention to DV is well-motivated because of its high social and economic costs (Garcia-Moreno & Watts, 2011) and because stress, economic disruption and social isolation are established predictors of DV (Berg & Tertilt, 2012; Bright et al., 2020). Nevertheless, shutdowns were unprecedented, and they could reduce DV in some households by lowering exposure to DV triggers such as infidelity and alcohol consumption outside the home (Nemeth et al., 2012), limiting contact between non-cohabiting and former couples, and even strengthening some relationships (Sachser et al., 2021). Furthermore, increased public and private funding to support DV victims and survivors, together with increased media attention devoted to DV, around the time shutdowns were imposed (Bright et al., 2020) could have reduced repeated violence and escalation. Federal stimulus payments enacted in response to the pandemic also significantly lowered poverty rates (Wheaton et al., 2021). As a result of these opposing factors, the effects of shutdowns on overall DV levels were theoretically ambiguous and likely to vary across populations.

Determining the overall impact of shutdowns on DV requires careful empirical analysis, but results needed to be produced and disseminated rapidly to contribute to ongoing debates about pandemic policy (Reingle Gonzalez et al., 2020). Because of this urgency, researchers from a variety of disciplines relied on readily available administrative data to assess DV incidence. In the

[1] Examples of press coverage include Vanderklippe (2020), Allen-Ebrahimian (2020), Graham-Harrison et al. (2020), and Taub (2020). Governments around the world (Kottasová & Di Donato, 2020) and international organizations issued statements and implemented programs to address DV in the pandemic (UN Women 2020; FIFA, EC and WHO 2020). In the US, the Coronavirus Aid, Relief, and Economic Security (CARES) Act included $47 million of supplemental funding to address DV under the 1984 Family Violence Prevention and Services Act (FVPSA; Title III of P.L. 98-457) Program, an increase of 24% relative to appropriations from FY2020 and FY2019 (Fernandes-Alcantara & Sacco, 2020).

US, the main source has been real-time data published by individual police departments that provide one or two key measures of DV: calls for service (911 calls or radio dispatches) and criminal incident reports. Despite the initial set of papers yielding mixed results, the claim that shutdowns increase DV incidence has been presented as an established fact in media coverage and in political debates about pandemic restrictions (e.g., Biggs, 2020).

This paper is motivated by the observation that the empirical studies finding increases in DV in US cities examine DV service calls as their exclusive (Leslie & Wilson, 2020; McCrary & Sanga, 2021; Nix & Richards, 2021) or primary (Hsu & Henke, 2021) outcome measure. While service call volume measures demand for police resources, it is a limited proxy for rates of specific crimes because "callers can be mistaken in what they report" (Ashby, 2020b; p. 1061) and "not all domestic violence calls are for activities that constitute crimes" (Klein, 2009; p. 1). Papers that examine DV crime rates are more likely to find decreases in DV, particularly when they account for seasonal variation using data from prior years (Abrams, 2021; Ashby, 2020a; Bullinger et al., 2021; Miller et al., 2020).[2] However, because studies of the different police outcomes have differed in their geographic coverage, it is unclear if the divergence in estimates comes from systematic differences between the two types of police data or from geographic variation in the impact of shutdowns.

We address this important question by studying the 18 large, urban US police departments, serving over 14 million people, for which we were able to obtain incident-level data on both DV calls for service and DV assault crimes. We empirically estimate the impacts of shutdowns by comparing the differences in changes in each of our outcomes between the pandemic shutdown

[2] Piquero et al. (2020) study crime data from 2020 alone and are therefore unable to account for important seasonal variation (e.g., Fig. 1 in this paper). Evans et al. (2021) studies aggravated domestic assaults in Atlanta and finds larger percent growth between 2019 and 2020 in the first weeks of the year than during the shutdown period (Fig. 3).

period in 2020 and the earlier part of the year and the changes between the same time periods in 2019. We find an increase in DV calls but a decrease in DV assaults during shutdowns. When we follow the prior literature that links DV calls to the voluntary drop in mobility that preceded mandated shutdowns and estimate models that control for the pre-shutdown mobility drop, we find both DV assault crimes and DV calls are lower during shutdowns, relative to the immediately preceding period. We also find no evidence that intimate partner homicides increased during shutdown months, and suicides, which have been linked to DV (Stevenson & Wolfers, 2006), were lower. These results fail to provide empirical support for claims that DV increased because of pandemic shutdowns, and instead suggest that violence may have decreased.

2. DATA AND METHODS

Our sample includes the 18 large (serving 250,000 or more people) US police departments for which we were able to obtain incident-level, real-time data on both DV calls for service and DV assault crimes. The police departments in our sample, listed in Table 1, collectively serve over 14 million people.[3] The initial shutdowns in these cities started between March 17 and March 31, 2020.[4] We focus on the impact of the initial shutdowns to avoid complications related to re-opening and repeated closures and therefore end the sample period on May 6, 2020, the earliest reopening date in our sample. This also allows us to compare our results to the existing literature that mainly investigates DV outcomes in the first few months of the pandemic. We include all DV calls for service and all DV assaults. We focus on DV assaults, because they are the most commonly

[3] Data sources are listed in Table S1. Population served is from 2018 Law Enforcement Officers Killed and Assaulted (LEOKA) Data Collection (Kaplan, 2020).
[4] Table S2 shows sources for shutdown and reopening dates.

reported DV crime category across police departments.[5] Our measure of DV assaults is based on police criminal incident reports, and not on arrests or convictions.

We separately analyze each of our two main outcomes, DV assault crimes and DV service calls. The raw data clearly show opposing trends in these two outcomes during the pandemic, foreshadowing our main results. From January through mid-March, DV assault crimes in 2020 followed a similar seasonal pattern to those crimes in 2019 (Figure 1, Panel A). After that, 2020 DV assaults decreased slightly relative to 2019 levels, as cities started to mandate shutdowns, leading to a sizable relative decline in April and early May. In contrast, DV service calls in 2020 tracked those in 2019 in January and February, but diverged in the month of March, when 2020 calls increased at a higher rate.

In addition to showing the differential trends, Figure 1 also illustrates the disparity in rates between the two outcomes: DV calls are 4 times more frequent than DV assaults.[6] This disparity highlights the fact that most DV calls do not lead to DV criminal incident reports, making it important not to rely on DV calls alone for tracking incidence. Furthermore, it would be inaccurate to assume that DV calls include all DV assault crimes, as not all DV assault crimes originate from such calls.[7]

The trends in Figure 1 also illustrate the key strategy underlying our empirical approach. To estimate the impact of shutdowns on our DV outcomes of interest, we need to compute a counterfactual for what DV levels would have been in the absence of shutdowns. We accomplish

[5] We omit less serious misdemeanor DV crimes, examined in Los Angeles (Miller et al., 2020), that are less commonly reported.

[6] In our baseline data for 2019, the ratio of DV calls to DV assaults was 4.4 to 1 (Table S1). Even when less serious crimes are included, Miller et al. (2020) find a three to one ratio of DV calls to DV crimes in Los Angeles from 2018-2020.

[7] Because we lack the data to measure the flows between calls and crimes in our full sample, we investigated this using data from Fort Worth, Texas, the largest department in our sample for which we can merge data on individual calls and crimes. In the 2019 baseline, only 78.5% of DV assault crimes can be linked to DV calls.

this by exploiting data from 2019 to account for seasonal variation in DV within the year and from the pre-shutdown months to account for inter-year variation in DV levels.[8] Our models formally compare differences in DV outcomes during the pandemic shutdown period relative to the earlier months of 2020 to the differences between the same time periods in 2019.

Our first specification takes this form:

$$DV_{it} = \beta_1 Shutdown_{it} + \boldsymbol{dow_t} + \boldsymbol{m_t} + \boldsymbol{y_t} + \boldsymbol{\psi_i} + \epsilon_{it} \quad \text{(Model 1)}$$

DV_{it} is the domestic violence outcome of interest, measured at the city-day level and scaled to city population. We include a vector of city ($\boldsymbol{\psi_i}$) and year ($\boldsymbol{y_t}$) fixed effects and account for seasonal and within-week variation with month ($\boldsymbol{m_t}$) and day of week ($\boldsymbol{dow_t}$) fixed effects. The error term (ϵ_{it}) captures random city-day level independent shocks that affect outcomes. We report robust standard errors that allow for heteroskedasticity. Because larger cities are less subject to random fluctuations in their daily crime rates, we follow the usual practice and weight all regressions by city population.

In our first model, $Shutdown_{it}$ is an indicator variable that takes a value of 1 if a shutdown is effective in city *i* on day *t*. The β_1 coefficient captures the difference-in-differences estimate described above.[9] We also report estimates from a second model that aims to match the prior literature focusing on the effect of the nationwide voluntary mobility decline that preceded the mandatory shutdowns:

$$DV_{it} = \alpha_1 MobilityPost_t + \boldsymbol{dow_t} + \boldsymbol{m_t} + \boldsymbol{y_t} + \boldsymbol{\psi_i} + \epsilon_{it} \quad \text{(Model 2)}$$

[8] We focus on 2019 because it is the closest year, but we also find that results are robust to including data from 2018. See discussion in Supplemental Section S3 and Figures S1 and S2.

[9] All US cities were of course affected by the pandemic and experienced shutdowns at around the same time. We therefore rely on 2019 to provide a "control" year that was unaffected by the pandemic and define the "pre" and "post" periods based on calendar date (month and day) within the year. While it is possible to compare locations with larger and smaller drops in voluntary mobility, it is not obvious that measure captures meaningful variation in the severity of the pandemic (i.e., that places with smaller drops in mobility, possibly because they contain more essential workers, were somehow less affected by the stress, health impact, or other hardships caused by the pandemic).

In this model, the $Shutdown_{it}$ variable is replaced with a $MobilityPost_t$ indicator that takes a value of 1 starting on March 14, 2020 (McCrary & Sanga, 2021), the day after the nationwide emergency declaration. The coefficient α_1 is therefore a difference-in-differences estimate of the average change in outcomes between the period after the voluntary mobility decline between 2020 and 2019 compared to the average change in outcomes that occurred between these years in the period between January 1 and March 13.

Finally, we report estimates from a model that includes both explanatory variables from the prior two models, which allows us to distinguish the effects of city-specific mandatory shutdowns from those attributable to the earlier nationwide voluntary mobility decline:

$$DV_{it} = \gamma_1 Shutdown_{it} + \gamma_2 MobilityPost_t + \boldsymbol{dow_t} + \boldsymbol{m}_t + \boldsymbol{y_t} + \boldsymbol{\psi_i} + \epsilon_{it} \quad \text{(Model 3)}$$

In this model, γ_1 represents the incremental change in DV during the shutdown period, in addition to the change caused by the voluntary mobility decline, which is estimated by γ_2. As in Model 2, these changes are between 2020 and 2019 in comparison to the average changes between these years that occurred between the beginning of the year and March 13.

Another parameter of interest is the average change in DV during the shutdown period between 2020 and 2019 relative to the period between January 1 and March 13 (i.e., the period before the voluntary mobility decline in 2020) between the two years. That parameter is calculated by summing the γ_1 and γ_2 coefficients.

3. RESULTS

We present our three main empirical findings in Figure 2 and Table 2. The first finding is that shutdowns are associated with a significant decrease in DV assault crimes. There was no measurable change in DV assault crimes during the pre-shutdown period of reduced mobility, but there was a large and significant drop of 0.188 ($p < 0.01$), corresponding to 10.0% of the 2019

baseline, during shutdowns. The decline in DV assaults during shutdowns is present for both simple DV assaults and aggravated DV assaults (see Table S6).

Our second finding is a statistically significant increase in the number of DV calls during the shutdown period (Model 1) and the period of reduced mobility from March 14 forward (Model 2). This confirms that the source of conflict between our first finding, the negative estimate for DV assaults, and the prior finding in the literature of increased DV calls is the differential effect of the pandemic on DV crimes and calls. By analyzing cities with both DV call and crime data, we reject the possibility that heterogeneity across city samples causes the conflicting results.[10]

However, the regression estimates from Model 3 also show our third main finding that DV calls to police increased prior to the enforcement of mandatory shutdowns and should not be attributed to shutdowns themselves. The increase in daily DV calls during the pre-shutdown period of declining mobility is 0.661 per 100,000 ($p<0.01$; 7.9% of baseline; Table 2). The incremental effect of the shutdown, relative to this elevated rate, is actually a decline of 0.359 DV calls per 100,000 ($p<0.05$). Despite this decline relative to the period immediately before shutdowns, DV calls were still elevated during shutdowns, compared to pre-pandemic period from January 1 to March 13 (0.303, $p<0.01$). This again confirms that calls for service and DV crimes show opposing trends during the shutdown period.

The results presented in Figure 2 and Table 2 persist across multiple alternative sample definitions, including adding data from 2018 to expand the comparison group and omitting one city at a time from the sample (Figures S1 and S2). We also confirmed the lack of city-specific pre-trends in outcomes in the 4 weeks leading up to the city shutdowns that are not accounted for

[10] Monthly data from New York City, which is not in our sample but is the largest police department in the US (Figure S3), further confirm that DV assaults decreased while calls increased even in cities whose police departments do not publish real time daily police data on crimes and calls.

by the voluntary national mobility decline. The only significant estimate in Table S3 is an increase in DV calls in the week before the shutdown in Model 1 (column 2), coinciding with a period of voluntarily lower mobility in all cities. This estimate becomes negative and insignificant after accounting for the mobility drop in Model 3.

Despite their value in providing a rapid view of the ongoing pandemic, it is important to note additional limitations of the real-time police data used in this analysis. Because these data rely on reporting by individual police departments, they are limited in scale and the findings may not generalize to other cities. Even their internal validity can be questioned because real-time crime data differ from official Justice Department reporting efforts in that there are no quality standards or requirements for data inclusion or coding. We attempted to validate the real-time crime data by comparing them to historical National Incident-Based Reporting System (NIBRS) data (Kaplan, 2021) and found variation in match rates for DV crimes across cities (Figure S4). Quality concerns are even more significant for calls data because there are no federal data products related to police service calls.

The main findings of this paper call into question claims of conclusive empirical support from real-time police data that pandemic shutdowns increased DV. Although calls for service were higher, they increased before shutdowns were mandated. Furthermore, the increase in DV calls was clearly not matched by an increase in DV crimes, which declined substantially during shutdowns.

4. INTERPRETATION

How can the opposite effects of shutdowns on DV calls and crimes be reconciled? One possibility is that crimes decreased but reporting rates increased because of additional DV calls for non-criminal incidents or non-DV crimes. These calls could have increased during shutdowns from

third-party reporters, such as neighbors, who had incomplete information about events in the home, and were more likely to be home themselves and possibly more aware of the issue because of media coverage of DV risks. Support for this mechanism is found in Greater London police data where the increase in DV calls during the pandemic was attributed to third-party callers (Ivandic et al., 2020). Data on caller type are not available in the US and would be particularly valuable. Given the relative timing of the effects on DV calls and crimes in US, it is also possible that some of the calls to police for non-criminal domestic incidents before the shutdown, in combination with the additional financial resources and public attention devoted to the issue of DV, had a deterrent effect, preventing escalation and lowering crime rates during the shutdown (Miller & Segal, 2019).

An alternative possible reconciliation is that the additional DV calls reflected an increase in DV crimes, but that fewer crimes were recorded because of reductions in policing intensity for DV cases during the shutdown.[11] The departments in our sample all have written operational procedures for handling domestic disputes and designated personnel to address DV (US DOJ, 2007, 2013). Although police departments altered procedures to reduce officer exposure to and community spread of COVID-19, they have not relaxed recording requirements for DV, and in public statements assert that they continue to prioritize those cases (Police Executive Research Forum, 2020). The initial shutdown period also saw dramatic reductions in non-DV violent crimes (e.g., Miller et al., 2020; Abrams, 2021), freeing time and resources to address DV. Furthermore, the explanation that failures of police record-keeping is the source of the drop in crimes seems more likely for less serious crimes than for the assaults that we study. The significant decrease in aggravated assaults is particularly compelling on this point because those crimes are least likely to

[11] Bullinger et al. (2021) characterizes the divergence between DV calls and recorded DV crimes in Chicago as reflecting "substantial underfiling [by police] of official incident reports for domestic crimes" (page 267) and studies the ratio of reported DV crimes to DV calls for service in Table 7 as a measure of the extent to which police officers "avoid filing a domestic violence report" (page 269).

be neglected in official reports from police responding to 911 calls. Furthermore, in Los Angeles, where crimes can be linked to arrest records, there is no evidence of less intensive policing of DV in the form of fewer arrests per crime during the initial shutdown (Miller et al., 2020).

Although we lack the data to directly examine the possibility that failures of police drive the observed crime reductions,[12] we are able to shed light on the question of police negligence in responding to serious DV during shutdown by studying changes in the extreme outcome of intimate partner homicide (IPH). Because homicides are almost universally reported to police, this outcome avoids the interpretation challenge for other police data coming from the fact that DV reporting rates by victims and witnesses respond to external factors (Miller & Segal, 2019) and may have been elevated or depressed by pandemic shutdowns.

Our analysis of IPH uses newly released Supplementary Homicide Reports (SHR) from Uniform Crime Reporting system (Kaplan, 2021), with incident-level data that identifies the reporting police department, month of occurrence, and relationship between victim and offender. We compute difference-in-differences estimates for the impact of shutdowns using a simplified version of main estimation approach, by comparing the change in outcomes to the shutdown period in 2020 (April and May) from the pre-pandemic data from the start of 2020 (January and February) to the change of the same time periods in the prior year. Our sample includes 17 of our 18 cities because departments in Florida do not participate in the SHR in our time period.

Panel A of Figure 3 plots the IPH rates (per million population) for each of the four time periods and shows no evidence of a relative increase in either outcome during shutdowns: the implied difference-in-difference impact of shutdowns is zero. Using monthly police department level data, we formally estimated the corresponding regression model comparing IPH rates in

[12] Conclusions about police behavior would require comprehensive information on police procedures and staffing during shutdowns, as well as data on domestic incident reports filed for non-criminal incidents.

shutdown months (April and May in 2020) to January and February in 2020 and the same four months in 2019, with agency, year and month fixed effects, and weighting by population served, and confirm the economic and statistical insignificance of the estimate (<0.0001, s.e. of 0.342).[13]

We also examine the more frequent outcome of suicide, which has been linked to DV in prior research (e.g., Stevenson & Wolfers, 2006). Our data on suicide rates are CDC estimates currently available at the state-quarter level (Ahmad & Cisewski, 2021). Panel B of Figure 3 shows the comparison between the first and second quarters of 2020 and 2019 for the 12 states containing any of our 18 cities. The relative change during the shutdown quarter is a reduction of 1.53 suicides per 100,000 population. We confirm the statistical significance of the drop in the corresponding regression model using state-by-quarter data, with state, year and quarter fixed effects, and weighting observations by population, resulting in a standard error of 0.433 (p-value = 0.001).[14]

While it is still possible that non-fatal DV increased significantly during shutdowns, and went unreported to police, or that shutdowns caused changes that will affect DV rates in the future, none of the results in this analysis support a contemporaneous increase in DV during government-mandated shutdowns.

5. CONCLUSION

This paper uses incident-level police data on DV calls and crimes from major US cities that provided both measures to characterize the empirical evidence on the impact of pandemic more fully. Contrary to many media reports and claims by opponents of pandemic shutdowns (e.g.,

[13] We omitted March because shutdowns started during that month. Results are unchanged if we include the month and treat it as shutdown or not. Results are also unchanged if we extend the sample backward in time. Starting the sample in 2000 yields an estimated impact of shutdowns on IPH rates of -0.047 (s.e. of 0.217). Expanding the sample to include all departments serving 250,000 population or more in 2018 yields an estimate of 0.00012 (s.e. 0.00013) for 2019 and 2020 and 0.00001 (s.e. 0.0001) when including data as far back as 2000.

[14] This is not coming from something unusual about 2019; adding data from 2018 to the model yields an estimated drop of 1.70 during the shutdown quarter (s.e. of 0.36).

Biggs, 2020), the evidence presented here does not support an increase in DV rates during mandatory shutdowns. Instead, we find significant decreases in recorded DV assault incidents that we argue is unlikely to come from increased police negligence in filing reports, in part because the decline is present for aggravated assaults. If police were failing to respond to these most serious crimes, we might expect to see increased fatalities related to DV during shutdowns. This is not what we find in monthly department-level data on intimate-partner homicides or in quarterly state-level data on suicides.

The conclusion that recorded DV appears to have been lowered by shutdowns should not be interpreted as evidence that concerns regarding DV in the pandemic were unwarranted in the US. On the contrary, it is possible that increased federal funding for support services, as well as community and private sector efforts, contributed to raising awareness (and elevating DV calls to police during the voluntary mobility drop) and improving support systems for victims and survivors. These measures may have contributed to lower DV assault rates and should therefore be considered during future pandemic shutdowns and also as ongoing policy efforts to reduce DV. This paper also illustrates the challenges faced by researchers who want to provide timely evidence to inform public policy related to DV. Enhanced real-time police data resources, with broad coverage across agencies and formal standards and requirements for data quality and elements, would be invaluable for future DV research and population health surveillance.

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FIGURES AND TABLES

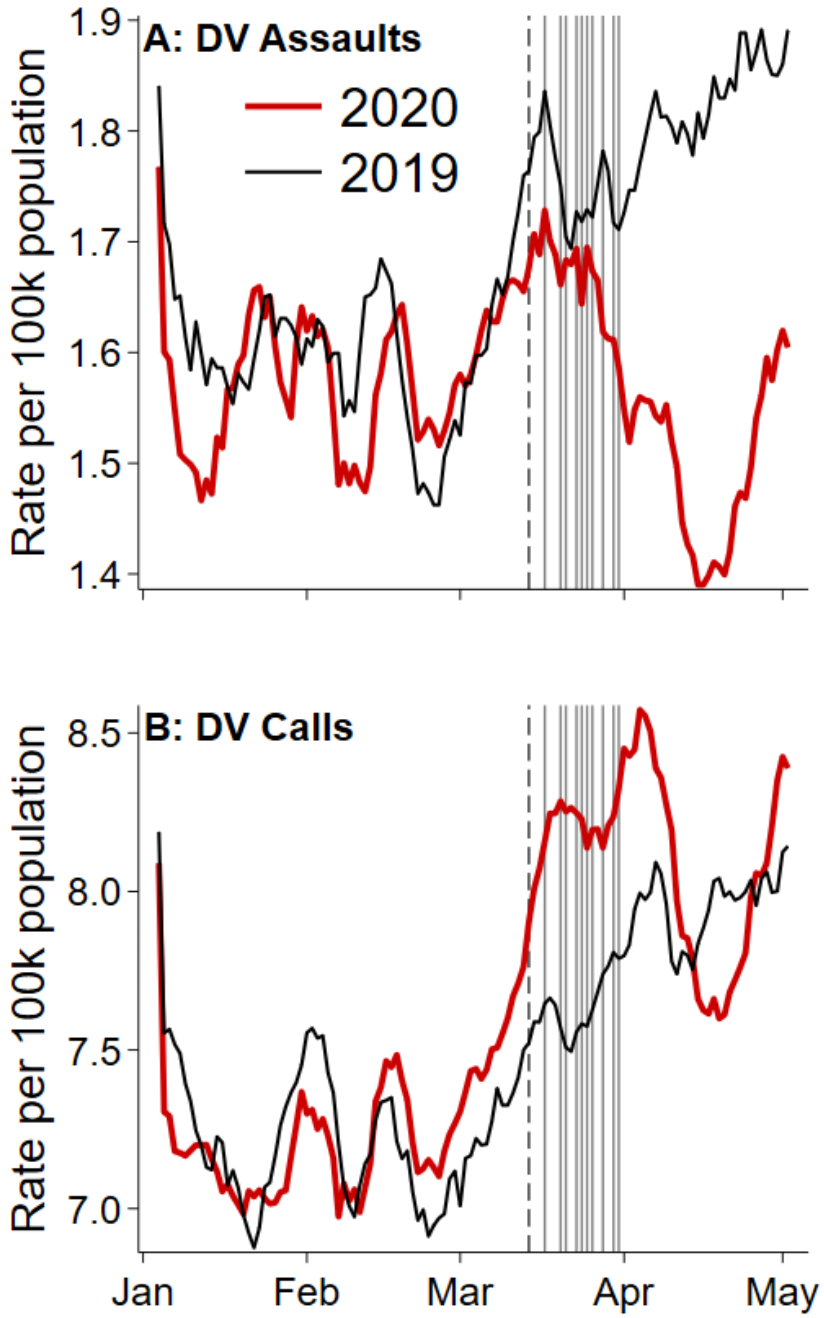


Figure 1. Trends in DV assault crimes and service calls. This figure depicts trends for (**A**) police reports of DV assault crimes and (**B**) DV service calls to police. Daily trends were calculated as the 7-day moving average of daily records, aggregated across cities, per 100,000 total population served. The dashed vertical line on March 14 indicates the date after the initial mobility decline began and the solid vertical lines indicate the dates of city shutdowns. The trends indicate a relative decrease in DV assaults during the shutdowns compared to 2019 (**A**), and a relative increase in DV service calls (**B**).

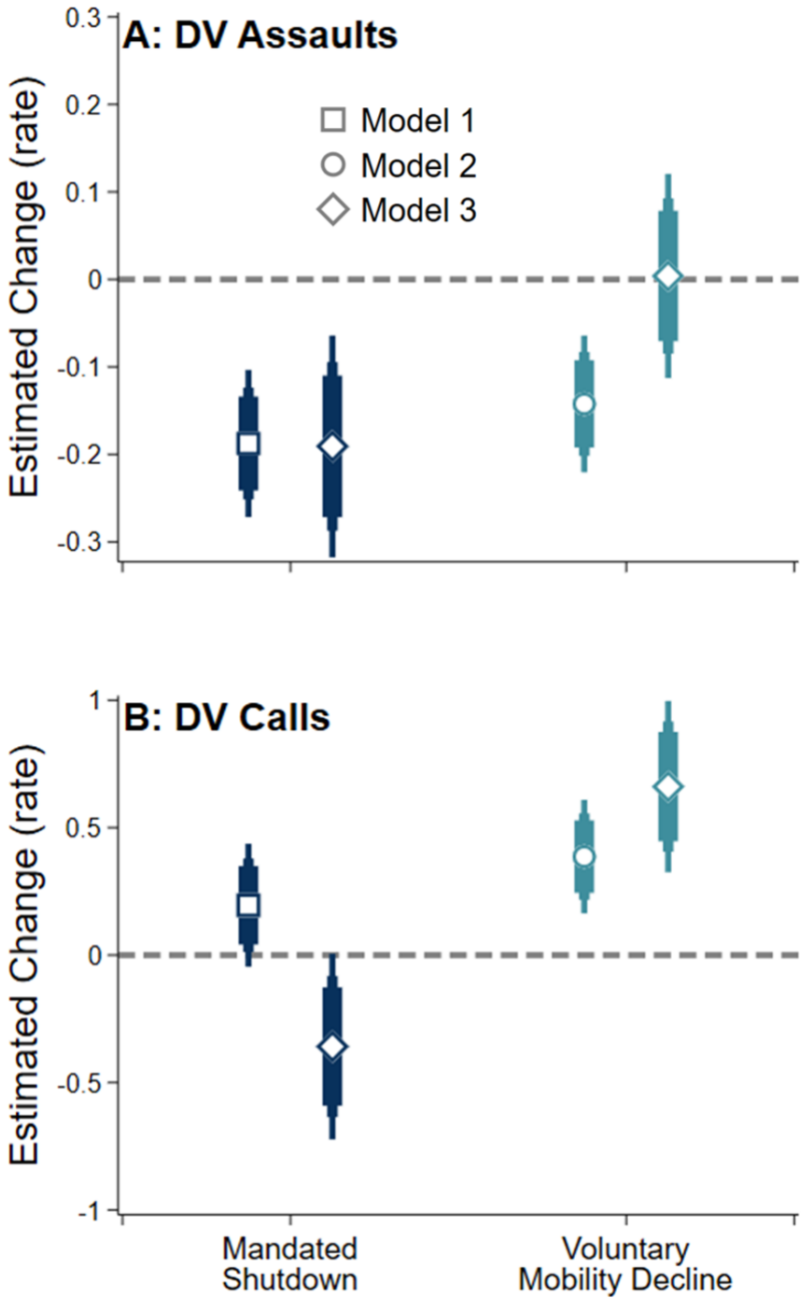


Figure 2. Effects of pandemic shutdowns on DV assault crimes and service calls. This figure shows point estimates and 90, 95, and 99 percent confidence intervals for the effects of pandemic shutdowns on rates per 100,000 population of police reports of DV assault crimes (**A**) and DV service calls to police (**B**). The unit of observation is a city-day. Shutdowns have a negative and statistically significant effect on DV assaults (**A**) across all models. After controlling for mandatory shutdowns, there is no significant change associated with the voluntary mobility decline (Model 3). DV calls (**B**) increased during the voluntary mobility decline (Models 2 and 3). DV calls were elevated during shutdowns (Model 1), but lower relative to the immediately preceding period of depressed mobility (Model 3).

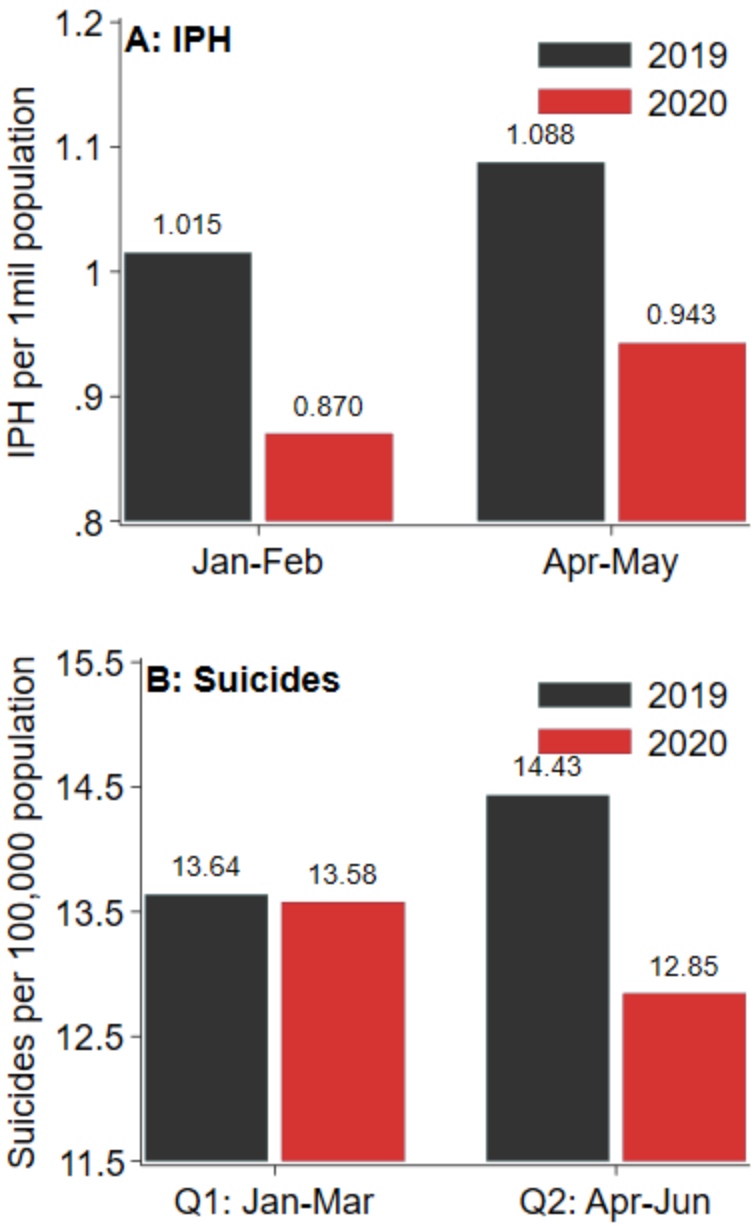


Figure 3. Effects of pandemic shutdowns on intimate partner homicide (IPH) and suicide rates. This figure shows death rates from pre-pandemic and pandemic shutdown months in 2020 and from the same months in 2019. The IPH data are available at the monthly level for each police department (except Orlando) and we show (**A**) January-February and April-May (omitting March, the month of the voluntary mobility drop and start of shutdowns). Preliminary suicide data are at the state-quarter level, so we show (**B**) January-March and April-June for the 12 states in which our sample cities are located.

Table 1. Sample of Municipal Police Departments

	Nationwide Rank by Pop. Served	Population Served	Initial Shutdown	Initial Reopening
Los Angeles, CA	2	4,029,741	3/20	5/29
Chicago, IL	3	2,719,151	3/21	6/3
Fort Worth, TX	21	893,756	3/25	5/8
San Francisco, CA	23	889,282	3/17	9/1
Memphis, TN	38	652,226	3/24	5/6
Tucson, AZ	43	537,392	3/31	5/8
Mesa, AZ	48	504,873	3/31	5/8
Kansas City, MO	50	493,115	3/24	5/6
Virginia Beach, VA	58	451,001	3/30	5/15
Minneapolis, MN	60	428,261	3/28	6/1
New Orleans, LA	65	396,374	3/20	5/16
Chesterfield Co., VA	72	346,692	3/30	5/15
St. Paul, MN	82	309,756	3/28	6/1
St. Louis, MO	84	306,875	3/23	5/18
Cincinnati, OH	86	301,952	3/24	5/15
Orlando, FL	92	286,679	3/25	5/11
Durham, NC	96	273,759	3/26	6/1
Chandler, AZ	105	255,986	3/31	5/8
		14,076,871		

Notes: This table lists the police departments included in the main estimation sample, which consists of all departments serving a population of 250,000 or more and providing real-time data on domestic-related calls for service and assault crimes. Sources are details can be found in the supplementary materials.

Table 2. Main Estimation Results

Panel A: Domestic Assault Crimes

	Model 1	Model 2	Model 3
City Shutdowns (Shutdown Start - May 5)	-0.188***		-0.191***
	[0.033]		[0.049]
Voluntary Mobility Decline (March 14 - May 5)		-0.142***	0.004
		[0.030]	[0.045]
Shutdown Relative to Pre-Mobility Decline			-0.187***
			[0.034]

Panel B: Domestic Calls for Service

	Model 1	Model 2	Model 3
City Shutdowns (Shutdown Start - May 5)	0.195**		-0.359**
	[0.094]		[0.141]
Voluntary Mobility Decline (March 14 - May 5)		0.386***	0.661***
		[0.086]	[0.130]
Shutdown Relative to Pre-Mobility Decline			0.303***
			[0.096]
Observations	4,536	4,536	4,536
Year and city fixed effects	X	X	X
Month and day of week fixed effects	X	X	X
Weighted by population	X	X	X

This table presents the results from estimating equations 1-3 in the paper using city-day level data, weighted by city population. Outcomes are rates of DV assault crimes (Panel A) or service calls (Panel B) per 100,000 population. Robust standard errors are shown in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Supporting Information Appendix for:

Effects of COVID-19 Shutdowns on Domestic Violence in US Cities

Amalia R. Miller, Carmit Segal and Melissa K. Spencer

S1. Building the Police DV Dataset

The sample of police departments (PDs) used in this analysis included all large, local PDs that made incident-level data on both DV calls for service and DV crimes available in real time. We started by using data from 2018 Law Enforcement Officers Killed and Assaulted (LEOKA) Data Collection (Kaplan, 2020) to compile a list of 107 local PDs that served a population of at least 250,000 people. We checked city and county open data archives as well as PD webpages to identify police departments from this list that published incident-level calls for service and crime data with DV information in real-time.[1] Only 7 of the 107 PDs in our list published this information online. To expand our sample, we identified 30 PDs that have published either calls or crime DV data in real-time since 2019 and submitted a public records request for data on the missing measure. This approach allowed us to identify PDs that were most likely to maintain the relevant data and respond to our request. Of the 30 requests submitted, we received responses and usable data from 11 PDs by July 14, 2021, resulting in our final sample of 18 police departments.[2] Data sources, including date accessed, for all PD data are listed in Table S1.

Using the incident-level PD data, we calculated city-level, daily counts of calls and crimes for our primary variables of interest: DV calls for service and DV assault crimes (see supplementary text S2 for information on variable definitions). We then used population data from

[1] Specifically, we looked for PDs with any DV information in calls data and DV information for all assaults in crime data.

[2] Most PDs did not respond to our request or refused to provide the requested information. Three PDs provided data that was unusable due to missing information.

LEOKA (Kaplan, 2020) to compute the daily number of calls and crimes per 100,000 population served.

We added to the police data information on the dates of city stay-at-home orders and initial re-openings, obtained from internet searches. We coded initial shutdown dates by the date a stay-at-home order took effect in a city. If an order took effect at 8 pm or later on a given day, we coded the shutdown as starting the following day. In order to consistently identify reopening dates across cities with various approaches to pandemic shutdowns, we coded the date reopened as the date hair salons and barbershops were allowed to open. Sources for all shutdown and reopening dates are listed in Table S2.

To allow comparison to the previous literature, we limited our analysis to the period of initial shutdown. Thus, we dropped all observations that occurred after May 5, since May 6 is the earliest re-opening date in our sample. Our final police dataset is a balanced panel of 4,536 observations covering the period January 1 to May 5 in 2019 and 2020. Table S4 presents the base (pre-pandemic) values of our outcome variables in the period starting in January 1, 2019 and ending on May 5, 2019. It is notable that DV calls are about 4 times as high as DV assaults crimes and that simple DV assaults are more prevalent than aggravated DV assaults.

S2. Validating Real-Time Police Data Quality

There is substantial variation in how PDs record calls for service and crimes. Data structure, codes for calls and crimes, and the extent to which DV is recorded differ across the PDs in our sample. We reconciled these differences in a number of ways. First, we used all available information in a dataset to determine if a call or a crime was a domestic-related incident, often including multiple variables and matching on parts of keywords to identify DV. Table S5 describes the variables and keywords used to identify DV for each data source. Second, we only used variables in this analysis that were available across all PDs. For example, all domestic calls for service and all domestic assault crimes were clearly identifiable across the PDs data used in this analysis. We excluded other possible categorizations that are less clear, such as distinguishing between calls coded as "domestic disturbance" from those coded as "family fight." We also excluded possible categories for less severe domestic crimes such as stalking and intimidation, which are often omitted from PD data. Third, in cases where a PD reports multiple crimes (or calls) per incident, we ensured comparability across all PDs by following the data structure of PDs that collapse incidents to a single crime record by only using the most severe crime recorded. Fourth, we used date reported for both calls and crime incidents whenever possible. However, there are three PDs in our sample that only provided occurrence data for crime data.[3] Because the PD data we are utilizing were published on voluntary base and are not subject to common reporting requirements, we also took steps to validate our final dataset.

To provide a check for data quality, we compared the real-time data we obtained from the PDs to the official Justice Department National Incident-Based Reporting System (NIBRS; Kaplan, 2021). The latest data available from the NIBRS is for 2019. This is also the year with the

[3] These three PDs are Chicago, Memphis, and St. Louis.

broadest coverage. There are eight PDs in our sample that also reported to the NIBRS in 2019. For each of these departments, we calculated, as we did for the real-time data, the daily rates of DV assault crimes per 100,000 population. We were able to identify DV in NIBRS using information on the victim's relationship to the offender. We considered any assault incident for which the victim was the offender's, spouse, dating partner, ex-partner, or family member as a DV incident. As with the real-time data, we used only the most severe crime in an incident to identify DV assaults. The differences between the NIBRS data and real-time data vary across PDs (Figure S4). Memphis (**E**) and Virginia Beach (**H**) match very well. The overall level of DV crime differs across NIBRS and real-time data for Fort Worth (**F**), but trends are parallel across the two data sources. Durham (**C**), Cincinnati (**D**), and Chesterfield County (**G**) also exhibit similar trends across their two data sources, with slight differences in levels. Real-time data form Minneapolis (**A**) and Kansas City (**B**) exhibit similar levels to the NIBRS data, however there are periods of time within 2019 when the trends in the two data sources diverge.

Given these differences in data quality across cities, we conducted robustness checks of our main analysis to show that dropping one city at a time does not change estimates, and that our results are not driven by one city with poor data quality (see Section S3). We also conducted a robustness check in which we limited the sample only to the 8 police departments that reported to the NIBRS and the results are unchanged, though less precise (see Figure S1)

S3. Robustness of Results in Figure 2 to Alternative Sample Definitions

We conducted robustness checks to show that the results presented in Figure 2 and Table 2 are consistent across alternative sample definitions.

For DV assaults, we defined 41 alternative samples. First, we added data from 2018 to expand our control group and improve precision in our estimates of seasonal, day-of-week and city controls. The results are similar to those from our main sample, which shows restricting the comparison to 2019 does not affect our results (alternative sample 1). Second, we excluded one city at a time from the sample to show that results are not driven by a single city (alternative samples 2-19). This robustness check is of particular importance given the variation in data quality across cities documented in Section S2. We ran this test using samples that exclude and include the 2018 data (alternative samples 20-37). We also tested whether results were sensitive to dropping cities that only reported crimes by date of occurrence as opposed to date reported (alternative sample 38), and whether results were consistent when only including cities that reported data to NIBRS by 2019, which might result in their having higher quality data (alternative sample 39). We ran these last two tests separately excluding and including the 2018 data (alternative samples 40 and 41).

We repeated our analysis of DV calls using alternative samples 1-37. We did not examine alternative samples 38 and 40 because calls data always include the date of reporting. Similarly, there was no need for alternative samples 39 and 41 because NIBRS data only offer comparisons for assaults and not for calls.

Figure S1 shows the results of re-estimating Models 1, 2, and 3 for DV assaults using each of the alternative sample definitions described above. Coefficients are ordered by increasing magnitude, with the main result from Figure 2 highlighted in red. 90 and 95 percent confidence

intervals are shown. Shutdowns have a negative and statistically significant effect on DV assaults across all sample definitions (**A** and **B**). The nationwide mobility decline has a negative and statistically significant effect for 39 out of 41 alternative sample definitions (**C**), however this effect goes away when controlling for mandated shutdowns (**D**).

Figure S2 shows the results of re-estimating Models 1, 2, and 3 for DV calls using each of the first 37 alternative sample definitions. The effect of shutdowns in DV calls is not statistically different from zero for 4 of the 37 alternative sample definitions (**A**). The initial mobility decline has a positive effect on DV calls across all samples (**C** and **D**). The incremental decrease in DV calls following the period of voluntary mobility decline is also significant across all samples.

Thus, Figures S1 and S2 show that our main results are robust to these alternative sample definitions, lending support to their accuracy.

S6. Comparison of Results to DV Trends in New York City

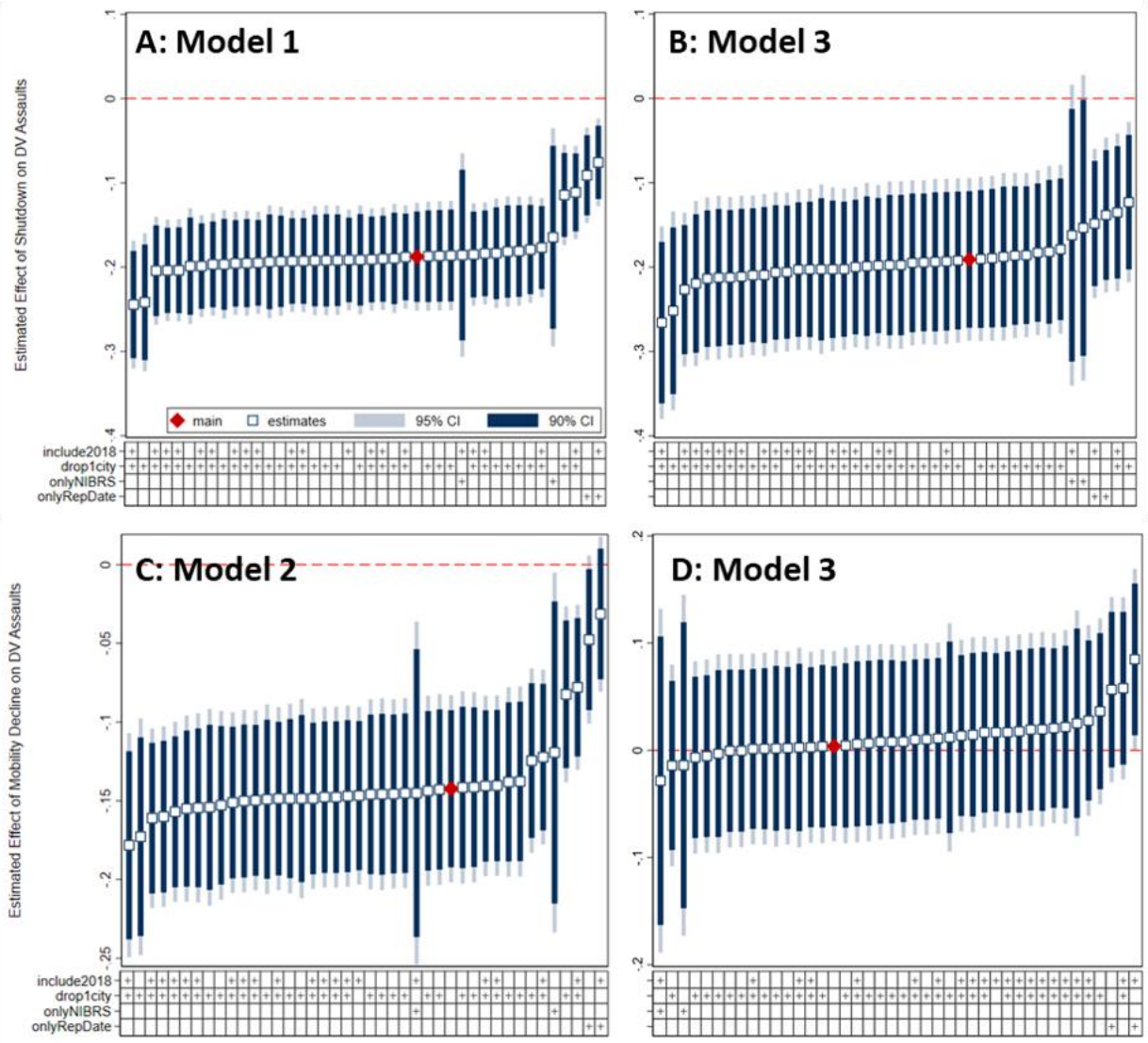
One potential concern with our sample composition is that PDs with real-time DV data might differ from PDs that do not make this data available in ways that are related to DV outcomes or the impact of the pandemic. In other words, we might be concerned that our results would not generalize to other cities outside of the selected sample. To test this, we compared our results to the DV trends in New York City. The NYPD is the largest PD by population served in the US. The NYPD is not in our main sample because it does not make real-time, incident level data available. However, they do publish monthly DV statistics (Table S1). Figure S3 shows the monthly rates of DV radio runs (service calls) and DV felony assault crimes in NYPD data. These trends show a similar pattern to our main finding. After starting out higher in 2020 than in 2019 in January and February, DV assaults decreased in 2020 relative to 2019 in March, April and May. DV service calls were similar in 2019 and 2020 in January and February, but there was substantial relative increase in March of 2020 that was largely reversed in April and May.

S7. Effects of Pandemic Shutdowns on Simple and Aggravated DV Assaults

Table S6 shows the results of a regression analysis of DV simple assaults and DV aggravated assaults. Each regression includes controls for month, day of week, year, and city and is weighted by population served. The unit of observation is at the city-day level. Robust standard errors are calculated and shown in brackets. Statistical significance is indicated by *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Model definitions are described in the text.

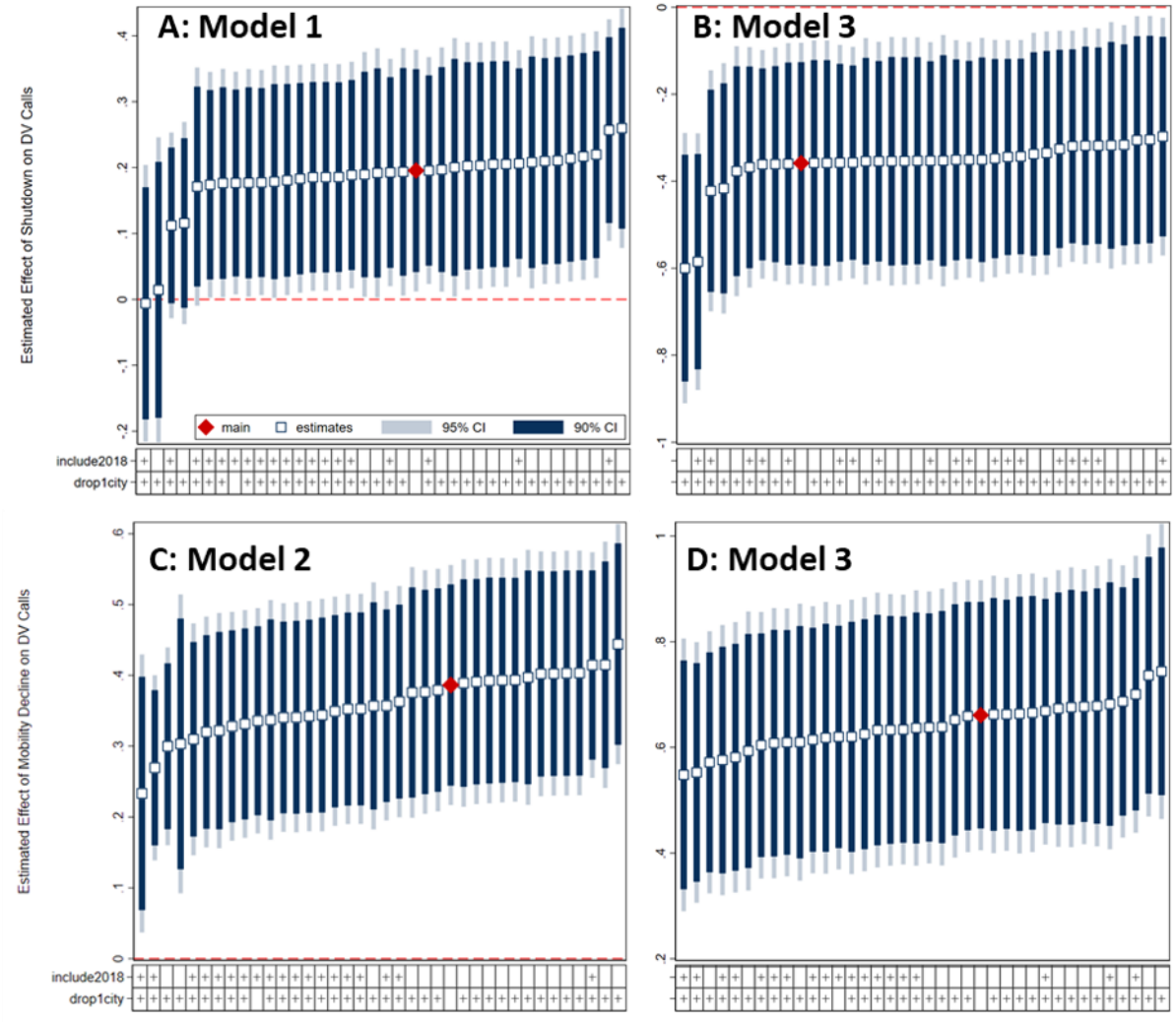
The results from Model 1 show that both simple and aggravated DV assaults decreased during mandated shutdowns relative to pre-shutdown dates. The results from Model 2 show a similar result for the period of voluntary mobility decline. Model 3 allows us to compare the effect of mandatory shutdowns to the effect of the pre-shutdown mobility decline. We find that DV simple assaults were unaffected by the voluntary mobility decline but decreased with mandatory shutdowns. There was no statistically significant incremental change in DV aggravated assaults following mandatory shutdowns. However, when we added the two coefficients estimated in Model 3, we obtained the effect of the shutdown relative to the period prior to the voluntary mobility decline. This estimate shows that aggravated assaults declined significantly during the shutdown period.

Fig. S1. Alternative Sample Definitions for DV Assaults



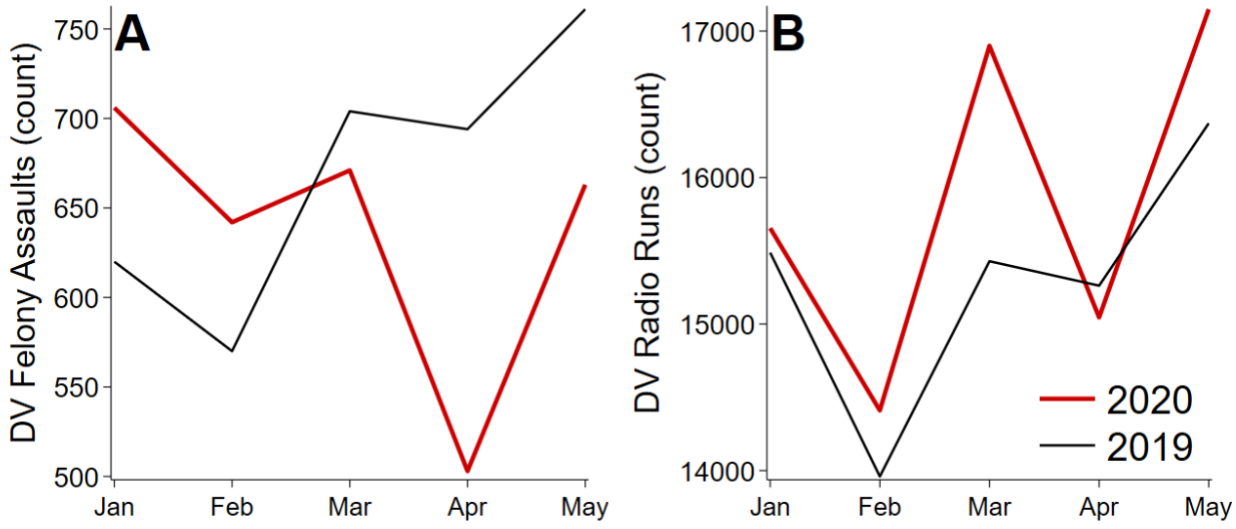
This figure shows that the results presented in Figure 2 are robust to various sample definitions. Each coefficient is from estimating one of the models discussed in the text. Estimated effects of shutdowns on DV assaults are presented for Model 1 (**A**) and Model 3 (**B**). Estimated effects of the voluntary mobility decline on DV assaults are presented for Model 2 (**C**) and Model 3 (**D**). The main estimate from Figure 2 is shown in red. The other estimates are from combinations of four alternative sample definitions: adding 2018 to the control period; dropping one city in the sample at a time; limiting the sample to PDs that report data to NIBRS; and dropping data that uses crime occurrence date instead of reporting date. See section S5 for details.

Fig. S2. Alternative Sample Definitions for DV Calls for Service



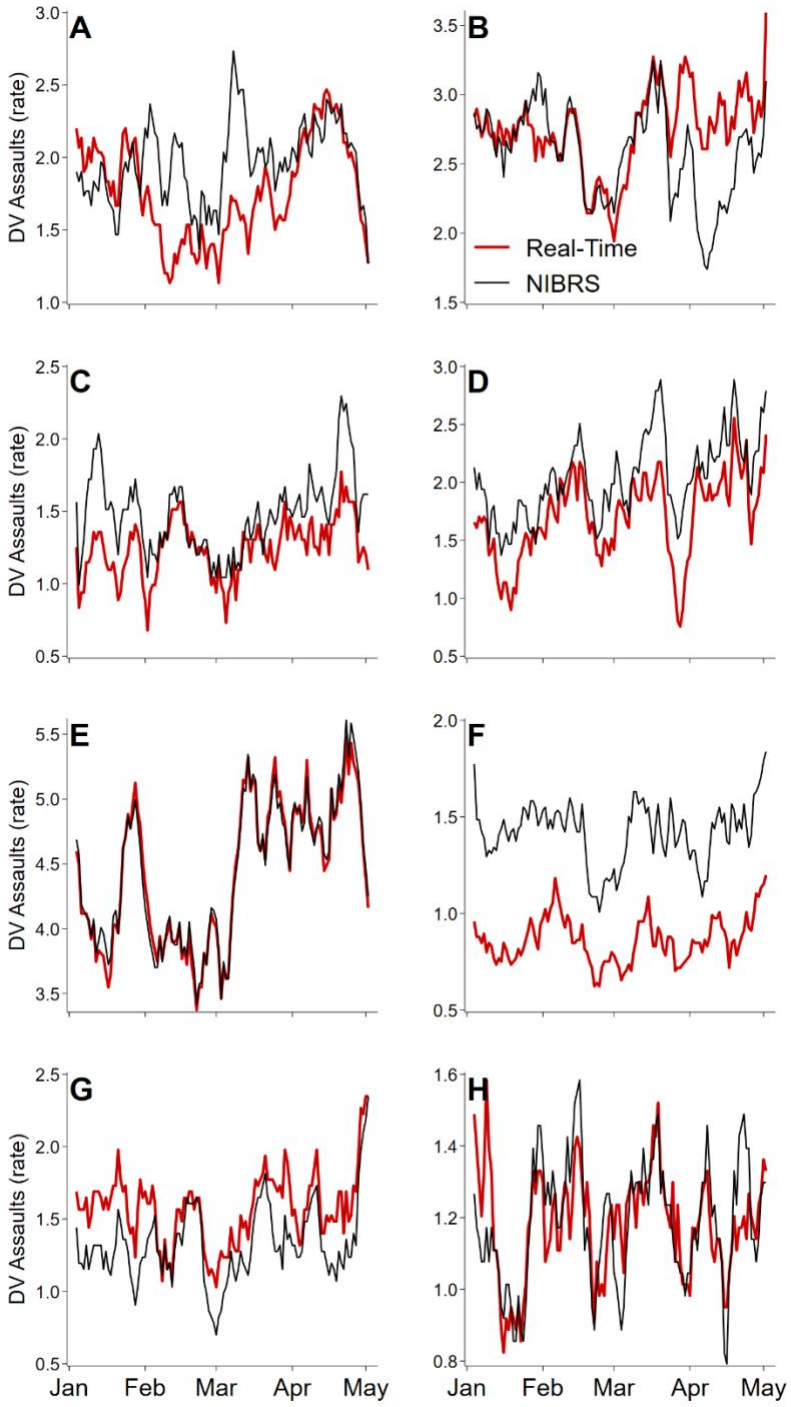
This figure shows that the results presented in Figure 2 are robust to various sample definitions. Each coefficient is from estimating one of the models discussed in the ext. Estimated effects of shutdowns on DV service calls are presented for Model 1 (**A**) and Model 3 (**B**). Estimated effects of the voluntary mobility decline on DV assaults are presented for Model 2 (**C**) and Model 3 (**D**). The main estimate from Figure 2 is shown in red. The other estimates are from combinations of two alternative sample definitions: adding 2018 to the control period and dropping one city in the sample at a time. See section S5 for details.

Fig. S3. Monthly DV Calls and Crimes in New York City



This figure depicts monthly trends in New York City for DV Felony Assaults (**A**) and DV radio runs (**B**). NYPD does not publish real-time, incident level data for DV crimes or calls, but it publishes monthly values (see Table S1). Trends in New York City confirm the results presented in the main analysis. There is a relative decline in DV assault crimes starting in March and growing in April (B) and an increase in DV radio runs in March that is reversed in April (**B**).

Fig. S4. Comparing Real-Time Police Data with NIBRS



This figure compares the real-time data used in this analysis to the data available in the National Incident Reporting System (NIBRS) in 2019 for Minneapolis (**A**), Kansas City (**B**), Durham (**C**), Cincinnati (**D**), Memphis (**E**), Fort Worth (**F**), Chesterfield County (**G**), and Virginia Beach (**H**). Trends were calculated as rate per 100,000 population using a 7-day moving average of daily records. The extent to which the real-time data matches the data in NIBRS varies across PDs.

Table S1. Sources for Real-Time Police Department Data on DV Calls and Crimes

Police Dept.	Data	Accessed	Source
Chandler, AZ	Calls for Service 2020	16-Feb-21	https://data.chandlerpd.com/catalog/calls-for-service-2020/download/csv
Chandler, AZ	Calls for Service 2019	16-Feb-21	https://data.chandlerpd.com/catalog/calls-for-service-2019/download/csv
Chandler, AZ	Calls for Service 2018	16-Feb-21	https://data.chandlerpd.com/catalog/calls-for-service-2018/download/csv
Chandler, AZ	Crime Incidents	16-Feb-21	https://data.chandlerpd.com/catalog/general-offenses/download/csv
Chesterfield Co., VA	Calls for Service	16-Feb-21	https://opendata.arcgis.com/datasets/3ab9da9edada490d87a7043ca44f276f_0.csv
Chesterfield Co., VA	Crime Incidents	16-Feb-21	https://opendata.arcgis.com/datasets/bbe7449609fb4938b2472eed6b44d44f_1.csv
Chicago, IL	Calls for Service	23-Oct-20	FOIA Request
Chicago, IL	Crime Incidents	16-Feb-21	https://data.cityofchicago.org/Public-Safety/Crimes-2001-to-Present/ijzp-q8t2
Cincinnati, OH	Calls for Service	16-Feb-21	https://data.cincinnati-oh.gov/api/views/gexm-h6bt/rows.csv
Cincinnati, OH	Crime Incidents	16-Feb-21	https://data.cincinnati-oh.gov/api/views/k59e-2pvf/rows.csv
Durham, NC	Calls for Service	16-Nov-20	FOIA Request
Durham, NC	Crime Incidents	16-Feb-21	https://opendata.arcgis.com/datasets/c2878bf2510542dc92213b57641d01b4_4.csv
Fort Worth, TX	Calls for Service	21-Dec-20	FOIA Request
Fort Worth, TX	Crime Incidents	30-Jun-21	https://data.fortworthtexas.gov/api/views/k6ic-7kp7/rows.csv
Kansas City, MO	Calls for Service	5-Nov-20	FOIA Request
Kansas City, MO	Crime Incidents 2020	1-Jul-21	https://data.kcmo.org/api/views/vsgj-uufz/rows.csv
Kansas City, MO	Crime Incidents 2019	1-Jul-21	https://data.kcmo.org/api/views/pxaa-ahcm/rows.csv
Kansas City, MO	Crime Incidents 2018	1-Jul-21	https://data.kcmo.org/api/views/dmjw-d28i/rows.csv
Los Angeles, CA	Calls for Service 2020	16-Feb-21	https://data.lacity.org/resource/84iq-i2r6
Los Angeles, CA	Calls for Service 2019	16-Feb-21	https://data.lacity.org/resource/r4ka-x5je
Los Angeles, CA	Calls for Service 2018	16-Feb-21	https://data.lacity.org/resource/nayp-w2tw
Los Angeles, CA	Crime Incidents 2020	16-Feb-21	https://data.lacity.org/resource/2nrs-mtv8.csv
Los Angeles, CA	Crime Incidents pre2020	16-Feb-21	https://data.lacity.org/resource/63jg-8b9z.csv
Memphis, TN	Calls for Service	15-Apr-21	FOIA Request
Memphis, TN	Crime Incidents	1-May-21	https://data.memphistn.gov/api/views/ybsi-jur4/rows.csv
Mesa, AZ	Calls for Service	17-Jun-21	https://data.mesaaz.gov/api/views/ex94-c5ad/rows.csv

Mesa, AZ	Crime Incidents	17-Jun-21	https://data.mesaaz.gov/api/views/39rt-2rfj/rows.csv
Mesa, AZ	Crime Supplement	13-Jul-21	FOIA Request
Minneapolis, MN	Calls for Service	6-Feb-21	FOIA Request
Minneapolis, MN	Crime Incidents - FOIA	1-Mar-21	FOIA Request
Minneapolis, MN	Crime Incidents - 2020	2-Jul-21	https://opendata.arcgis.com/datasets/35c7de976a60450bb894fc7aeb68aef6_0.csv
Minneapolis, MN	Crime Incidents - 2019	2-Jul-21	https://opendata.arcgis.com/datasets/8cd15449ac344aa5a55be7840d67c52d_0.csv
Minneapolis, MN	Crime Incidents - 2018a	2-Jul-21	https://opendata.arcgis.com/datasets/055e662af18c4488b54dcbd496f897b7_0.csv
Minneapolis, MN	Crime Incidents - 2018b	2-Jul-21	https://opendata.arcgis.com/api/v3/datasets/58e6f399e0f04c568b3ba45086d15818_0/downloads/data?format=csv&spatialRefId=4326
New Orleans, LA	Calls for Service 2020	24-Jun-21	https://data.nola.gov/api/views/hp7u-i9hf/rows.csv?accessType=DOWNLOAD
New Orleans, LA	Calls for Service 2019	24-Jun-21	https://data.nola.gov/api/views/qf6q-pp4b/rows.csv?accessType=DOWNLOAD
New Orleans, LA	Calls for Service 2018	24-Jun-21	https://data.nola.gov/api/views/9san-ivhk/rows.csv?accessType=DOWNLOAD
New Orleans, LA	Crime Incidents 2020	24-Jun-21	https://data.nola.gov/Public-Safety-and-Preparedness/Electronic-Police-Report-2020/hjbe-qzaz
New Orleans, LA	Crime Incidents 2019	24-Jun-21	https://data.nola.gov/Public-Safety-and-Preparedness/Electronic-Police-Report-2019/mm32-zkg7
New Orleans, LA	Crime Incidents 2018	24-Jun-21	https://data.nola.gov/Public-Safety-and-Preparedness/Electronic-Police-Report-2018/3m97-9vtw
New York, NY	Monthly DV Data	8-Jun-21	https://www1.nyc.gov/site/nypd/stats/reports-analysis/domestic-violence.page
Orlando, FL	Calls for Service	24-Jun-21	https://data.cityoforlando.net/api/views/69ge-5wp8/rows.csv?accessType=DOWNLOAD&bom=true&query=select+*
Orlando, FL	Crime Incidents	24-Jun-21	https://data.cityoforlando.net/api/views/4y9m-jbmz/rows.csv?accessType=DOWNLOAD&bom=true&query=select+*
Orlando, FL	DV Crime Incidents	22-Jun-21	FOIA Request
San Francisco, CA	Calls for Service	17-Jun-21	https://data.sfgov.org/api/views/hz9m-tj6z/rows.csv?accessType=DOWNLOAD
San Francisco, CA	Crime Incidents	13-Jul-21	FOIA Request
St Louis, MO	Calls for Service	27-Jun-21	FOIA Request
St Louis, MO	Crime incidents	30-Jun-21	https://www.slmpd.org/Crimereports.shtml
St Paul, MN	Calls for Service	4-Nov-20	FOIA Request
St Paul, MN	Crime Incidents	16-Feb-21	https://information.stpaul.gov/api/views/gppb-g9cg/rows.csv
Tucson, AZ	Calls for Service 2020	16-Feb-21	https://opendata.arcgis.com/datasets/c32b1adee46e497d88380a791284f8b9_53
Tucson, AZ	Calls for Service 2019	16-Feb-21	https://opendata.arcgis.com/datasets/712c6d76150840ec85af0c52ec18f71e_47

Tucson, AZ	Calls for Service 2018	16-Feb-21	https://opendata.arcgis.com/datasets/d1b5db92494341699cbb60d1db507060_39
Tucson, AZ	Crime Incidents 2020	16-Feb-21	https://opendata.arcgis.com/datasets/0cd8b23211b84cdb9334a6b548916623_54
Tucson, AZ	Crime Incidents 2019	16-Feb-21	https://opendata.arcgis.com/datasets/9205a32aeab34091b1cd9bcea08eccfe_48
Tucson, AZ	Crime Incidents 2018	16-Feb-21	https://opendata.arcgis.com/datasets/6a11fe12a2f9444fa16e7b7ac810727e_40
Virginia Beach, VA	Calls for Service	16-Feb-21	https://s3.amazonaws.com/vbgov-ckan-open-data/Police+Calls+For+Service.csv
Virginia Beach, VA	Crime Incidents	16-Feb-21	https://s3.amazonaws.com/vbgov-ckan-open-data/Police+Incident+Reports.csv

Table S2. Sources for Shutdown and Reopen Dates

City	Shutdown Source	Reopen Source
Chandler, AZ	https://www.tucsonaz.gov/newsnet/gov-ducey-issues-stay-home-order	https://www.kold.com/2020/05/08/tucson-salons-barber-shops-reopen-following-covid-closures/
Chesterfield Co., VA	https://www.governor.virginia.gov/media/governorvirginiagov/executive-actions/EO-55-Temporary-Stay-at-Home-Order-Due-to-Novel-Coronavirus-(COVID-19).pdf	https://www.13newsnow.com/article/news/health/coronavirus/hair-salons-take-precautions-to-prevent-the-spread-of-covid-19-during-reopening-phase/291-62a9307f-da51-484e-a721-bb5b33c30816
Chicago, IL	https://www.chicago.gov/city/en/depts/mayor/press_room/press_releases/2020/march/StayAtHomeOrder.html#:~:text=Lightfoot%20today%20joined%20Governor%20JB,home%20or%20place%20of%20residence.&text=The%20order%20will%20take%20effect,Proclamation%20expires%20on%20April%207.	https://abc7chicago.com/chicago-reopening-phase-3-coronavirus-guidelines/6228603/
Cincinnati, OH	https://governor.ohio.gov/wps/portal/gov/governor/media/news-and-media/ohio-issues-stay-at-home-order-and-new-restrictions-placed-on-day-cares-for-children	https://www.cincinnati.com/story/news/2020/05/15/covid-19-salons-barbershops-reopen-ohio/5197024002/
Durham, NC	https://abc11.com/durham-mayor-order-stay-at-home-north-carolina-coronavirus-death/6049563/	https://www.cbs17.com/news/local-news/durham-county-news/durham-hair-salons-readjust-reopening-plans-as-stay-at-home-order-remains-in-place/
Fort Worth, TX	https://www.star-telegram.com/latest-news/article241446971.html	https://www.texastribune.org/2020/05/06/texas-reopening-hair-salons-barbershops-coronavirus/
Kansas City, MO	https://www.kcmo.gov/Home/Components/News/News/265/625#:~:text=Erica%20Carney%20%E2%80%93%20today%20issued%20a,healthcare%20facilities%20will%20remain%20open.	https://www.kctv5.com/coronavirus/kansas-city-hair-salons-start-to-re-open-wednesday/article_fa6bb4b6-8fdf-11ea-a9a5-4fbc79ede6c2.html
Los Angeles, CA	https://www.cnbc.com/2020/03/19/los-angeles-mayor-issues-safer-at-home-order-asking-residents-to-limit-non-essential-movement.html	https://www.latimes.com/california/story/2020-05-29/newsom-la-restaurants-barbers-salons-reopen
Memphis, TN	https://covid19.memphistn.gov/wp-content/uploads/sites/76/2020/03/Executive-Order-No-03-2020.pdf	https://www.wmcactionnews5.com/2020/05/04/shelby-co-allows-hair-salons-barbershops-reopen-wednesday-germantown-tries-reopen-all-personal-service-businesses/
Mesa, AZ	https://www.tucsonaz.gov/newsnet/gov-ducey-issues-stay-home-order	https://www.kold.com/2020/05/08/tucson-salons-barber-shops-reopen-following-covid-closures/
Minneapolis, MN	https://www.startribune.com/minneapolis-will-enforce-stay-at-home-order-in-city-mayor-frey-says/569165392/	https://www.startribune.com/minnesotans-can-finally-return-to-salons-barbershops/570646002/

New Orleans, LA	https://nola.gov/mayor/news/march-2020/mayor-cantrell-issues-stay-home-mandate-in-response-to-covid-19/	https://www.npr.org/sections/coronavirus-live-updates/2020/05/16/857415229/new-orleans-begins-re-opening
Orlando, FL	https://www.orlando.gov/COVID-19/Stay-at-Home-Executive-Order-What-You-Need-to-Know	https://www.orlandosentinel.com/coronavirus/jobs-economy/os-bz-coronavirus-salons-reopening-20200511-nar2w24do5eajarzhcurpnp7bm-story.html
San Francisco, CA	https://sfmayor.org/article/san-francisco-issues-new-public-health-order-requiring-residents-stay-home-except-essential	https://sfmayor.org/article/san-francisco-resume-outdoor-personal-services-starting-september-1
St Louis, MO	https://news.stlpublicradio.org/health-science-environment/2020-03-21/st-louis-city-county-issue-stay-at-home-mandate-state-orders-social-distancing	https://www.ksdk.com/article/news/health/coronavirus/st-louis-hair-salons-reopen-coronavirus/63-60c6257a-908f-4814-9230-144d515dbd0a
St Paul, MN	https://www.startribune.com/minneapolis-will-enforce-stay-at-home-order-in-city-mayor-frey-says/569165392/	https://www.startribune.com/minnesotans-can-finally-return-to-salons-barbershops/570646002/
Tucson, AZ	https://www.tucsonaz.gov/newsnet/gov-ducey-issues-stay-home-order	https://www.kold.com/2020/05/08/tucson-salons-barber-shops-reopen-following-covid-closures/
Virginia Beach, VA	https://www.governor.virginia.gov/media/governorvirginiagov/executive-actions/EO-55-Temporary-Stay-at-Home-Order-Due-to-Novel-Coronavirus-(COVID-19).pdf	https://www.13newsnow.com/article/news/health/coronavirus/hair-salons-take-precautions-to-prevent-the-spread-of-covid-19-during-reopening-phase/291-62a9307f-da51-484e-a721-bb5b33c30816

Table S3. Pre-Trend Check

	Model 1		Model 3	
	DV Crimes	DV Calls	DV Crimes	DV Calls
	(1)	(2)	(3)	(4)
City Shutdowns (Shutdown Start - May 5)	-0.208***	0.298***	-0.275***	-0.484**
	[0.038]	[0.114]	[0.077]	[0.195]
Voluntary Mobility Decline (March 14 - May 5)			0.067	0.778***
			[0.066]	[0.156]
1 week before shutdown	-0.034	0.589***	-0.095	-0.127
	[0.055]	[0.167]	[0.078]	[0.203]
2 weeks before shutdown	-0.062	0.075	-0.083	-0.170
	[0.054]	[0.144]	[0.058]	[0.144]
3 weeks before shutdown	-0.028	0.143	-0.031	0.099
	[0.052]	[0.128]	[0.052]	[0.127]
4 weeks before shutdown	-0.054	-0.003	-0.054	-0.005
	[0.058]	[0.152]	[0.058]	[0.152]
P-value on joint test of pre-shutdown weeks	0.770	0.00713	0.590	0.405
Observations	4,536	4,536	4,536	4,536
Year and city FEs	X	X	X	X
Month and day of week FEs	X	X	X	X
Weighted by population	X	X	X	X

This table presents the results from estimating equations 1 and 3 in the paper with the addition of city-specific indicator variables for the weeks prior to government mandated-shutdowns. Robust standard errors are shown in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table S4. Summary Statistics

	Mean	Std. Dev.	Maximum
Domestic Assault Crimes	1.70	1.14	8.43
Domestic 911 Calls	7.54	5.12	28.36
Domestic Simple Assault Crimes	1.41	0.98	6.90
Domestic Aggravated Assault Crimes	0.29	0.28	2.23

This table presents the pre-pandemic (2019) descriptive statistics for the outcome variables used in this analysis. Each variable has a minimum value of zero and is calculated as rate per 100,000 population per day. DV calls are more than four times as common as DV assault crimes. Approximately 83 percent of DV assault crimes are simple assaults.

Table S5. List of Variables and Keywords Used to Identify DV in Police Data

City	Data	Variables	Keywords for partial string match
Chandler, AZ	Calls for Service	reportedas	Domestic
Chandler, AZ	Crime Incidents	primaryoffensedesc	Dv
Chesterfield Co., VA	Calls for Service	cad_disposition*_text	DOMESTIC
Chesterfield Co., VA	Crime Incidents	incidentoroffensetypedesc	DOMESTIC
Chicago, IL	Calls for Service	typedescr	DOMESTIC
Chicago, IL	Crime Incidents	domestic	true
Cincinnati, OH	Calls for Service	incident_type_desc	DOMESTIC
Cincinnati, OH	Crime Incidents	offense, hate_bias	DOMESTIC
Durham, NC	Calls for Service	Nature	DOMESTIC, FAMILY
Durham, NC	Crime Incidents	reportedas	DOMESTIC, FAMILY
Fort Worth, TX	Calls for Service	CallTypeDescription	DOMESTIC, Domestic
Fort Worth, TX	Crime Incidents	description	Fam, Domestic
Kansas City, MO	Calls for Service	DVCheck	DV
Kansas City, MO	Crime Incidents	dvflag	Y
Los Angeles, CA	Calls for Service	call_type_text	DOM VIOL, FAMILY
Los Angeles, CA	Crime Incidents	crm_cd_desc, mocodes, crm_cd	INTIMATE, 2000, 230, 236, 624, 625, 626
Memphis, TN	Calls for Service	CallDescription	Domestic
Memphis, TN	Crime Incidents	agency_crimetype_id	DV
Mesa, AZ	Calls for Service	eventtypedescription	Family Fight
Mesa, AZ	Crime Incidents	crimetype	DV
Minneapolis, MN	Calls for Service	Problem	Domestic
Minneapolis, MN	Crime Incidents	description	Domes
New Orleans, LA	Calls for Service	initialtypetext	DOMESTIC
New Orleans, LA	Crime Incidents	charge_description	DOMESTIC, DATING
Orlando, FL	Calls for Service	incidenttype	Domestic
Orlando, FL	Crime Incidents	DV incidents provided in FOIA request	n/a
San Francisco, CA	Calls for Service	originalcrimetypename	Dv
San Francisco, CA	Crime Incidents	DomesticViolence	Domestic Violence
St Louis, MO	Calls for Service	origcalldesc	Domestic
St Louis, MO	Crime Incidents	description	DOMESTIC
St Paul, MN	Calls for Service	DESCRIPTION	DMSTIC, DOMESTIC
St Paul, MN	Crime Incidents	incident	Dom.
Tucson, AZ	Calls for Service	naturecodedesc	DOM, DV, FAMILY; exclude: ANIMAL, ADVISEMENT
Tucson, AZ	Crime Incidents	statutdesc	DOM, DV, FAMILY FIGHT; exclude: ANIMAL
Virginia Beach, VA	Calls for Service	calltype	DOMESTIC
Virginia Beach, VA	Crime Incidents	offensecode, offensedescription	DOMESTIC

Table S6. Effects of Pandemic Shutdowns on Simple and Aggravated DV Assaults

Panel A: Domestic Simple Assault Crimes

	Model 1	Model 2	Model 3
City Shutdowns (Shutdown Start - May 5)	-0.148***		-0.163***
	[0.029]		[0.043]
Voluntary Mobility Decline (March 14 - May 5)		-0.107***	0.017
		[0.027]	[0.039]
Shutdown Relative to pre-Mobility Decline			-0.145***
			[0.030]

Panel B: Domestic Aggravated Assault Crimes

	Model 1	Model 2	Model 3
City Shutdowns (Shutdown Start - May 5)	-0.039***		-0.028
	[0.011]		[0.019]
Voluntary Mobility Decline (March 14 - May 5)		-0.035***	-0.013
		[0.011]	[0.018]
Shutdown Relative to pre-Mobility Decline			-0.042***
			[0.012]
Observations	4,536	4,536	4,536
Year and city fixed effects	X	X	X
Month and day of week fixed effects	X	X	X
Weighted by population	X	X	X

This table repeats the main analysis using simple and aggravated DV assaults as outcome variables. Robust standard errors are shown in brackets. *** p<0.01, ** p<0.05, * p<0.1.