

Police violence reduces civilian cooperation and engagement with law enforcement*

Desmond Ang,[†] Panka Bencsik,[‡] Jesse Bruhn[§] and Ellora Derenoncourt[¶]

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Abstract

How do high-profile acts of police brutality affect public trust and cooperation with law enforcement? To investigate this question, we develop a new measure of civilian crime reporting that isolates changes in community engagement with police from underlying changes in crime: the ratio of police-related 911 calls to gunshots detected by ShotSpotter technology. Examining detailed data from eight major American cities, we show a sharp drop in both the call-to-shot ratio and 911 call volume immediately after the police murder of George Floyd in May 2020. Notably, reporting rates decreased significantly in both non-white and white neighborhoods across the country. These effects persist for several months, and we find little evidence that they were reversed by the conviction of Floyd's murderer. Together, the results illustrate how acts of police violence may destroy a key input into effective law enforcement and public safety: civilian engagement and reporting.

JEL classification: K4

Keywords: police, crime reporting, use of force, race

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[†]Harvard University, Kennedy School of Government, 79 JFK St., Cambridge, MA 02138. Email: desmond_ang@hks.harvard.edu

[‡]University of Chicago, 33 N LaSalle St, Chicago, IL 60602. Email: pankabencsik@uchicago.edu

[§]Brown University, 64 Waterman Street, Providence, RI 02912. Email: jesse_bruhn@brown.edu

[¶]Princeton University, Department of Economics, Princeton, NJ 08544 and NBER. Email: ellora.derenoncourt@princeton.edu

In recent years, high-profile acts of police violence against unarmed Black individuals have sparked widespread allegations of racial discrimination and national calls for policing reform. Such events are not unique in American history, nor are their attendant concerns. Indeed, the Kerner Commission attributed civil unrest during the summer of 1967 to the belief in Black communities in “the existence of police brutality and a double standard of justice and protection,” while scholars have long argued that police violence may foster institutional distrust and legal cynicism (Kirk *et al.*, 2012; Sampson, 2012; Weitzer, 2002).

Central to these concerns is the understanding that civic trust and engagement is critical to many aspects of a well-functioning government, from law enforcement to public services. Police departments, in particular, are highly reliant on community cooperation and assistance to identify, report, and solve crimes. As former New York City police commissioner Bill Bratton stated, “police are most effective when they work in partnership with the community... when they are responding to citizens’ needs and working with citizens on determining priorities” (Bratton, 1997). If use of force degrades citizen engagement with police, these events could have the perverse effect of reducing policing efficacy, increasing crime and ultimately threatening public safety.

However, research exploring the causal effects of police violence on civilian-police cooperation is scarce and finds little consensus (Lerman & Weaver, 2014; Desmond *et al.*, 2016; Zoorob, 2020; Cohen *et al.*, 2019; Desmond *et al.*, 2020). Indeed, two studies examining 911 call patterns in Milwaukee after the 2005 police beating of Frank Jude come to opposite conclusions, with one claiming decreased call volume from Black neighborhoods and the other finding no effect. A fundamental complication with criminal justice research in general, and this topic in particular, is that nearly all relevant outcomes are subject to selection bias. 911 calls represent the intersection of incidents observed in a community and that community’s willingness to report those incidents to police. Thus, reductions in 911 calls could represent reduced trust in police or actual reductions in criminal incidents, two explanations with drastically different policy implications.

In theory, benchmarking changes in 911 call volume to changes in actual crime could help to disentangle the competing narratives. In practice, however, researchers only observe those crimes that have been reported to or directly observed by police, further compounding any selection biases. An additional complication is the possibility that the actual incidence of crime may also be impacted by police use of force. For example, some scholars have debated the existence of a “de-policing” or “Ferguson effect”, in which public scrutiny of police brutality leads to reduced law enforcement effort, which in turn fosters increased crime (Prendergast, 2001; Shi, 2008; Pyrooz *et al.*, 2016; Wolfe & Nix, 2016; Owens, 2019; Devi & Fryer Jr, 2020).

To isolate changes in community-police trust from actual changes in crime, we construct a novel measure of civilian crime reporting: the ratio of 911 calls routed to police in a community to the number of gunshots that occurred in the area. The gunshot data come from ShotSpotter, a system of fixed-location microphones used to detect and locate gunshots that has been implemented in cities across the nation. The system provides a consistent measure of gunfire in an area that is not reliant on civilian or police reporting. By combining this information with detailed data on 911 calls for service, we are able to observe, for a given gunshot, how likely a community is to call the police. We then examine how call rates changed in the aftermath of the high-profile police killing of George Floyd on May 25th, 2020 to observe how community trust is affected by police use of force.

We find evidence that high-profile acts of police violence may severely impair civilian trust and crime-reporting. Examining data for eight major cities, we show a sharp drop in the ratio of 911 calls to ShotSpotter shots immediately after George Floyd’s death. While gunfire spiked after Floyd’s killing, the total number of 911 calls dropped during the same period, resulting in a 50% decrease in civilian reporting rates. Notably, these effects are reflected across nearly all sample cities and persist until the end of 2020. We find decreases in civilian cooperation in majority-Black, majority-Hispanic and majority-white neighborhoods; however, the decline is largest in white communities. This is consistent with national survey evidence that suggests the murder of George Floyd had a large impact on white perceptions of the police.

These effects hold across a range of robustness checks, including controlling for seasonality trends using daily 911 call volumes from the prior year and accounting for pandemic-related changes in community mobility using Google tracking data. We also find similar effects when benchmarking 911 call volume to actual gun violence casualties (as opposed to ShotSpotter detected gunfire) and when examining 911 calls specifically related to “shots fired.”

Our findings highlight the additional civic ramifications of police violence, namely, erosion of trust in the police. To explore whether civilian engagement can be rebuilt after convictions of officers involved in police brutality, we extend our sample to examine trends through April 21, 2021, when Minneapolis police officer Derek Chauvin was found guilty of murdering George Floyd. Notably, we find little evidence that civilian reporting converges to pre-Floyd rates even after the Chauvin conviction. Together, our results point to the lasting damage that police violence may have on civilian trust and cooperation with law enforcement, thereby undermining the institution’s role in public safety and the dispatching of emergency services.

1 Focus on George Floyd’s murder

The murder of George Floyd was just one of a string of recent police killings of unarmed Black individuals. Every year, roughly a thousand people die at the hands of American law enforcement officers. Estimates suggest that more than half of these individuals were racial minorities and that roughly 40% did not possess a gun (Washington Post, 2021). While the vast majority of these incidents received little public attention and studies have shown that the social impacts of police killings are often highly geographically-localized (Ang & Tebes, 2020; Ang, 2021), viral footage of Floyd’s death spread rapidly across social and traditional media platforms, sparking nationwide protests and renewed debate about racial bias in policing. Thus, while the incident bears many similarities to other recent incidents, its high visibility allows us to interrogate the impact of police violence on civilian trust, even among communities with little direct exposure to those types of events.

[Figure I about here.]

As evidence, Figure I tracks trends in public perceptions of police before and after the killing of George Floyd. The data come from Nationscape and includes a nationally representative sample of 6,250 weekly interviews from January to July 2020. We find a sharp decrease (increase) in the share of respondents holding favorable (unfavorable) views of police after George Floyd’s death. Notably, this is true across racial groups, with similar patterns for white and Asian individuals, those groups who are least likely to be killed by law enforcement, as for Black and Hispanic individuals, those groups who are most likely to experience police violence.

Floyd’s killing merits particular focus for another reason. Derek Chauvin, the Minneapolis police officer who knelt on Floyd’s neck, was convicted of murder in a verdict seen on live television by over 23 million Americans. It is incredibly rare that police officers are charged, much less convicted, even after high-profile use of force incidents. For example, Darren Wilson was not indicted for killing Michael Brown in Ferguson, nor was Daniel Pantaleo charged for killing Eric Garner in New York. Of the roughly 15,000 fatal police killings that have occurred since 2005, only 140 officers were arrested for murder or manslaughter and of those, fewer than 50 were ultimately found guilty (Stinson, 2019).

Against this backdrop, Chauvin’s conviction was regarded as a watershed moment in police accountability. President Biden hailed the decision as a “giant step forward in the march toward justice in America,” while the Floyd family attorney called it a “turning point in American history for accountability of law enforcement.” Thus, the verdict presents a rare opportunity to assess whether highly-salient examples of officer discipline can repair civilian trust and reporting.

2 Background and data

2.1 ShotSpotter

ShotSpotter is an audio recording system designed to capture the time and location of gunshots fired in an area. It is one of the key tools in a recent movement towards technology-supported policing, and has been implemented in more than 100 cities nationwide. The technology relies on a dispersed set of permanently-mounted sensors located on buildings across a city. When a shot is fired, the sensors triangulate its location using Geographic Information System (GIS) technology and send a notification to the local police department with the predicted location of the shot.

ShotSpotter data is not without controversy. While the company claims the system can detect even silenced gunfire, there are concerns that it may also falsely classify car backfires, helicopters and fireworks as gunshots (Carr & Doleac, 2016). Community activists have further questioned how ShotSpotter data is used, arguing that its alerts may prime officers to incorrectly assume that suspects are armed and that the company’s close relationship with police may compromise the integrity of its data (Stanley, 2021). However, evaluations suggest that the technology is generally accurate: ShotSpotter is able to detect 80 to 99.6% of gunshots and to triangulate 91% of detected shots to within 40 feet of the actual location (Goode, 2012; Mazerolle *et al.*, 2000; Irvin-Erickson *et al.*, 2017; Watkins *et al.*, 2002).

Thus, while Shotspotter reports may include both false positives and false negatives, the data may nonetheless improve our ability to measure changes in violent crime when compared to traditional sources of crime micro-data, all of which rely on human reporting. The relative benefits of ShotSpotter data are especially pronounced in our specific context. While both community and police reporting may be influenced by public scandals like George Floyd’s murder (Ba & Rivera, 2019), any measurement error in ShotSpotter data is unlikely to be correlated with the timing of his death or the resolution of Derek Chauvin’s trial. As corroboration, we show robustness to using data on actual gun violence deaths and injuries, which

suffer neither the same measurement issues as ShotSpotter nor the reporting bias affecting lower-level offenses (Addington, 2008).¹

2.2 Civilian Crime Reporting

To construct our measure of civilian crime reporting, we combine ShotSpotter data with police-related 911 calls for service data. Calls for service are those that are initiated by citizens dialing 911. These calls are connected to local dispatch centers, which log the date and location of the call as well as details about the incident or crime being reported. This information is then routed to relevant public service providers (i.e, police, fire and medical services).

Our sample includes the eight ShotSpotter cities for which we were able to obtain both incident-level shot data and call-level data for 911 calls routed to police for the 2020 calendar year: Baltimore, Cincinnati, Washington (DC), Milwaukee, Minneapolis, New York City, Richmond (California) and San Diego.² Together, these cities include major metropolitan areas across the East Coast, West Coast and Midwest encompassing roughly 13 million residents.

To minimize measurement error in the ShotSpotter data caused by fireworks, we exclude data from New Year’s Eve, New Year’s Day and the Fourth of July. As ShotSpotter detectors only cover parts of a city, we also restrict the sample to 911 calls initiated from neighborhoods in ShotSpotter coverage areas.³ The final sample contains 6.3 million 911 calls and 47,325 detected shots in 2020.

Because the categorization of calls into crime types differs widely across cities, our primary outcome is defined as the ratio of total 911 calls to ShotSpotter detected shots in an area-period. However, as robustness, we manually identify call descriptions related to “shots fired” in each city and find similar patterns when examining the ratio of “shots fired” calls to detected gunshots.

¹Data on the date and location of gun violence casualties come from the gunviolencearchive.org, which compiles information from over 7,500 law enforcement, media, government and commercial sources.

²We only observe 911 calls related to gunfire in Minneapolis. For all other cities, we observe all 911 calls routed to police.

³Specifically, we examine only 911 calls that are located in Census tracts with at least one ShotSpotter detected shot over the sample period.

3 Results

3.1 National Trends

To investigate how civilian crime reporting responded to the police killing of George Floyd, Figure II plots the ratio of total weekly 911 calls to total weekly ShotSpotter shots over time. Both the numerator and denominator are aggregated across all sample cities.

[Figure II about here.]

As shown in Panel A, trends in call rates are relatively flat from the beginning of the calendar year until George Floyd’s murder, with the exception of a level shift downward when the national COVID-19 emergency was declared on March 13, 2020. Immediately following Floyd’s death, there is an even larger drop in 911 calls per shot. Citizen reporting declines from 207 calls per shot in the week prior to less than 90 calls per shot in the week after. Depressed call rates then persist throughout the remainder of 2020.

Panel B of Figure II examines trends in 911 calls and gunshots separately. For each variable, we normalize by the week prior to George Floyd’s killing, such that the lines represent the percent deviation in calls and gunshots from that week. Consistent with a potential “Ferguson effect,” we find a sharp jump in detected gunfire following Floyd’s death. Gunshots nearly double the week after and remain at elevated levels throughout the sample. Similar increases in the number of gun-related casualties are shown in Appendix Figure A.IV.

In contrast, 911 call volume drops over this same period. While calls were trending up to pre-pandemic levels in the weeks before Floyd’s death, they decrease by nearly 25% in the weeks after. This decline makes clear that our results are not driven by a hypothetical ceiling on civilian crime reporting. In other words, it is not the case that call-to-shot ratios dropped simply because residents reached some upper limit for 911 calls in the wake of increased gunfire. Instead, there is an explicit reduction in the tendency of individuals to reach out to police after Floyd’s death. That aggregate calls actually fell despite increased gunfire provides further

corroboration that civilian trust and cooperation with law enforcement was eroded after the murder of George Floyd.

Robustness

These patterns are robust to a number of alternative measures of civilian crime reporting. In our main specification, we focus on total 911 calls because differences in categorization criteria across departments may introduce measurement error when aggregating calls for specific crime categories. However, in Appendix Figure A.I we plot call rates and trends in calls focusing only on calls related to “shots fired”. Panel A of the figure shows that call rates using only “shots fired” calls decline swiftly in the weeks after Floyd’s death. Panel B shows that calls for “shots fired” increase in levels after the first week; however, this uptick is smaller than that in shots detected. “Shots fired” calls then drop dramatically while shots detected remain high relative to the week before Floyd’s death.

While ShotSpotter shots provide a measure of local crime that is not reliant on civilian or police reporting, examining trends in the ratio of 911 calls to gunshots may provide limited insight into effects on civilian crime reporting if total crime in an area is uncorrelated with gunfire. To address this concern, we identify calls for service triggered by automated alarms - such as silent bank alarms, home alarms and commercial alarms. As these incidents are captured without an individual having to call police, they may provide a consistent proxy of property crimes that is not subject to changes in local reporting. We thus replicate our primary analysis by charting 911 call volumes against the sum of ShotSpotter shots and automatic alarms. These results are shown in Appendix Figure A.II and again reveal a sharp drop in civilian engagement after Floyd’s murder.

As calls for service may be initiated by both police and private citizens, reductions in the 911 call-to-shot ratio could be driven by “de-policing” rather than reductions in civilian reporting. To address this concern, we exclude 911 calls related to traffic stops or patrols, those incidents that are most likely to arise from proactive policing. In Appendix Figure A.III, we

find a similar drop in the ratio of civilian-initiated 911 calls to ShotSpotter shots suggesting that changes in policing intensity are unlikely to drive our results.

Finally, it is possible that our results could be partly explained by an increase in ShotSpotter false positives, for example, due to noise from street demonstrations after Floyd’s murder or increased fireworks usage in the summer of 2020. However, we believe this is unlikely for two reasons. First, civilian reporting remained depressed at least through the end of December 2020, while Black Lives Matter protests had largely subsided by August 2020 (Kishi & Jones, 2020). Second, in Appendix Figure A.IV, we find similar patterns when benchmarking 911 calls to data on actual gun violence casualties, which is unlikely to suffer from the same sources of measurement error as ShotSpotter data.

3.2 City-Level Variation

Figure III disaggregates the call ratio trends by city. We focus on the period after the national COVID-19 emergency declaration and plot deviations in call-to-shot ratios, relative to each city’s call ratio during the week before George Floyd’s murder.

[Figure III about here.]

Notably, we find a pronounced drop in call rates immediately following the incident date in nearly all cities. In Baltimore, Cincinnati, DC, Milwaukee, New York and Richmond, call rates drop nearly 50% in the weeks after George Floyd’s death. The one case where trends are least clear, San Diego, is likely due in part to the city’s small SpotSpotter coverage area, which introduces noise in the denominator (ex: 15% of weeks had 0 or 1 detected shots).

Using the daily city-level data, we next leverage a simple regression model to estimate the average change in call ratios experienced after Floyd’s killing. We limit the sample to the 147-day window around the event (i.e., the 73 days between the national lockdown on March 13th and George Floyd’s murder on May 25th and the 73 days afterward) and define our outcome as the natural log of the call-to-shot ratio in a city-date.

[Table I about here.]

As shown in Column 1 of Table I, Panel A, cities experienced an average decrease in call rates of roughly 49% the day after Floyd’s death. To limit to within-city comparisons, we include city fixed effects in Column 2. To account for day of week and seasonality patterns, we include day of week fixed effects and control for daily national 911 call volumes from one year prior in Column 3.⁴ To account for the possibility that effects are driven by changes in local mobility (e.g., stay-at-home orders or protest activity, which may impact the likelihood of crimes being committed or observed), Column 4 controls for city-date-level variation in the amount of time spent in places of residence using Google tracking data. Across all specifications, we find similar decreases in civilian crime reporting.

The robustness of these effects as well as the fact that they are driven by cities across the country further highlights the broader civic ramifications of Floyd’s killing. While law enforcement agencies are locally-governed institutions, our findings suggest that citizens may view them as part and parcel of a larger criminal justice system. As a result, highly visible acts of police violence, like George Floyd’s murder in Minneapolis, may fuel distrust of local law enforcement agencies even among residents living in geographically and politically disparate areas.

3.3 Heterogeneity by Neighborhood Racial Composition

Though researchers disagree on whether officers discriminate in the use of force,⁵ Black and Hispanic individuals are far more likely than other groups to experience police violence and to believe that it is an important public issue (AP-NORC, 2015; Edwards *et al.*, 2019). In contrast, rates of civilian-initiated contact with police—such as reporting a crime or suspicious activity or approaching the police to seek help for a medical emergency—are highest among white individuals (Davis *et al.*, 2018). Thus, we next explore how the effects of George Floyd’s

⁴2019 call volume is aggregated across all cities for which we have 911 data from that year.

⁵For example, see Cesario *et al.* (2019); Knox *et al.* (2020); Hoekstra & Sloan (2020); Lieberman (2020); Ba *et al.* (2021).

murder on civilian crime reporting may have differed across racial groups.

To do so, we geo-code the 911 and ShotSpotter microdata to Census tracts, which we merge with 2015-2019 American Community Survey data to obtain area demographics. We then calculate call-to-shot rates specific to each racial group by, for example, dividing the total number of 911 calls in majority-Black tracts by the total number of gunshots detected in those same areas.

[Figure IV about here.]

Figure IV plots changes in weekly call rates by neighborhood race, normalized to call rates the week prior to Floyd’s killing. While trends in Asian call rates are noisy due to the scarcity of majority-Asian neighborhoods, we find large dips in calls per shot in majority-white, majority-Black and majority-Hispanic areas. Notably, the relative decrease in white call rates is as large, if not larger, than that of Black and Hispanic neighborhoods. This is corroborated in Panel B of Table I, which presents estimation results from our regression model.

These results stand in contrast to prior research showing that the educational and voting effects of police violence are driven entirely by Black and Hispanic communities (Legewie & Fagan, 2019; Ang, 2021; Ang & Tebes, 2020). We find instead that George Floyd’s death significantly reduced crime reporting across a wide range of communities, even those with the highest existing trust and engagement with law enforcement. This is consistent with the trends in police favorability examined earlier as well as broader discussions about the racial reckoning that viral footage of George Floyd’s murder sparked among many white Americans. While more research is needed, these results point to the pivotal role that media exposure may have on public views of law enforcement and racial discrimination, given the large differences in policing intensity and aggression that exist across neighborhoods.

4 Discussion

Together, our results provide novel insight into the deleterious effects that high-profile acts of police violence may have on civilian crime reporting. These effects are large, persistent and widespread. We find that George Floyd’s murder by Minneapolis police spurred a roughly 50% drop in 911 calls per gunshot, an effect that is mirrored across multiple cities and racial groups and that persisted over time.

A key question is whether trust rebounds after the disciplining of involved officers. We examine this in the context of Derek Chauvin’s conviction for the murder of George Floyd, a rare but highly-visible example of police accountability. Figure V plots trends in 911 call to shot ratios in the weeks before and after the verdict was announced on April 20, 2021.⁶ We find little evidence that the decision increased civilian crime reporting.

[Figure V about here.]

While many lauded Derek Chauvin’s conviction as a ground-breaking shift in police accountability, these results reinforce the enduring harm that George Floyd’s killing had on public trust and cooperation with law enforcement. They further suggest that local communities may view issues of police accountability as too endemic to be repaired with a single conviction, no matter how high-profile.

Among potential mechanisms behind our results is the viral footage of Floyd’s death as well as the nationwide racial justice movement that followed, keeping Floyd’s murder and other instances of police violence at the fore of the public’s mind for months. We leave it to future research to show the relative importance of these different mechanisms—for example, using variation in news coverage or protest activity across areas.

These findings sit at the intersection of recent discussions about violent crime and police reform. The call rate changes we observe reflect both an immediate spike in gunfire and a

⁶This includes all sample cities except Washington, DC, for which we only have data through December 31, 2020.

persistent drop in 911 call volume. Thus, police use of force may not only incite additional violence but also erode the mechanisms for curbing future crimes, as citizens become less likely to provide assistance or information to law enforcement. This compounding effect suggests that the full ramifications of George Floyd’s murder may not be seen for years to come. In doing so, it also suggests the need for a longer lens when evaluating the social and criminal ramifications of intensive, contact-heavy law enforcement strategies – such as stop-and-frisk and hot-spot policing.

At the same time, it is natural to wonder the extent to which our findings are applicable to other instances of aggressive policing. While prior research has found corroborating evidence of police violence’s negative impact on community health, these effects are highly-localized, affecting only individuals living in the immediate vicinity of an incident. However, existing studies also examine older incidents that occurred before the rise of cell phone cameras, social media platforms and recent social justice movements. In this light, the far-reaching consequences of George Floyd’s death may well predict the modern aftermath of controversial police killings, though this can only be confirmed with further research. At minimum, our findings suggest that public cooperation with police may have been fundamentally altered by George Floyd’s murder and that any future incidents will be assessed from a new baseline of heightened distrust and skepticism.

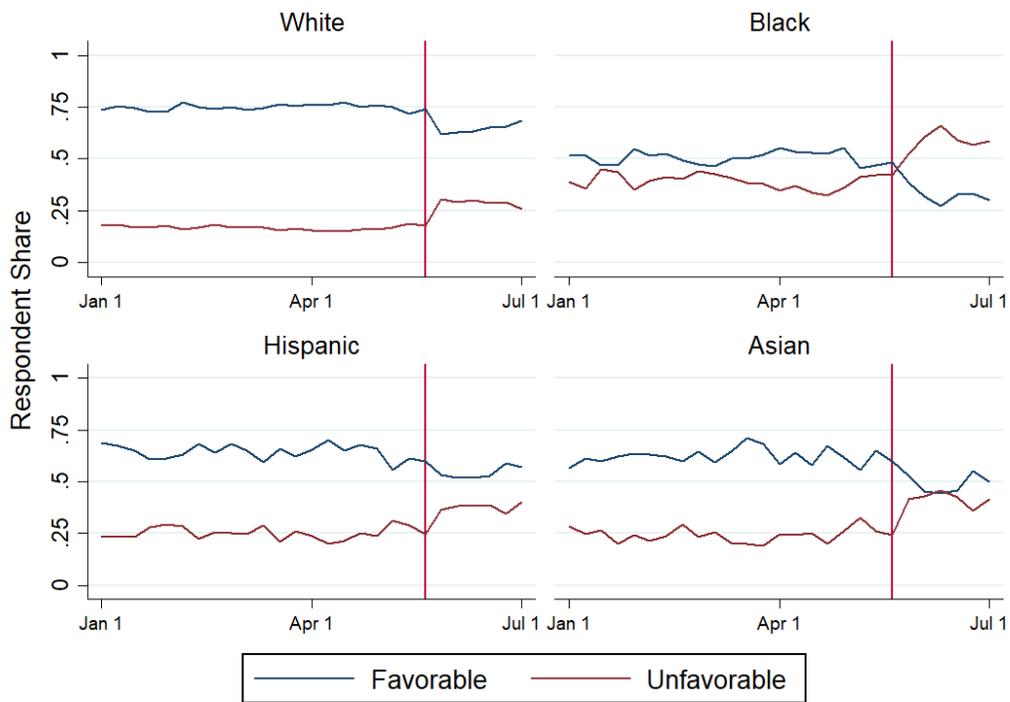


Figure I: Perceptions of Police over Time

Notes: Figure plots weekly police favorability ratings by respondent race. Data come from Nationscape, which include weekly surveys of 6,250 individuals (repeated cross-section). Respondents are asked to rate, on scale of 1 to 5, how favorably they view police. Blue line represents share of respondents with positive views (i.e., 4 or 5 rating). Red line represents share of respondents with negative views (i.e., 1 or 2 rating). Red vertical line represents the week of George Floyd's death.

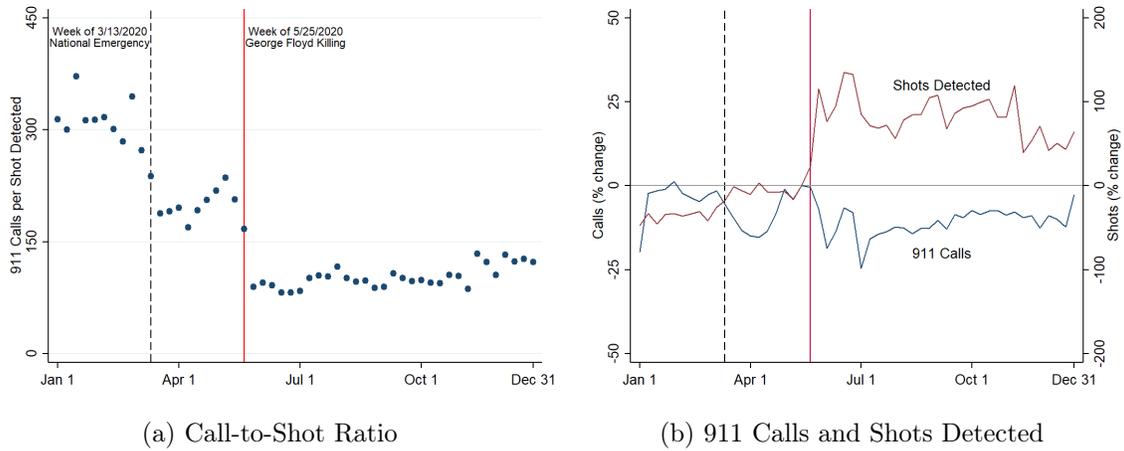


Figure II: Civilian Crime Reporting over Time

Notes: Panel A plots the ratio of 911 calls to ShotSpotter detected shots over time. 911 calls and shots detected are aggregated by week across ShotSpotter coverage areas in all eight sample cities: Baltimore, Cincinnati, Washington (DC), Milwaukee, Minneapolis, New York, Richmond (California) and San Diego. Panel B plots the percent change in 911 calls and ShotSpotter shots over time, relative to the value of each variable during the week prior to George Floyd’s death. Dashed vertical line represents the week the COVID-19 National Emergency was declared. Red vertical line represents the week of George Floyd’s death.

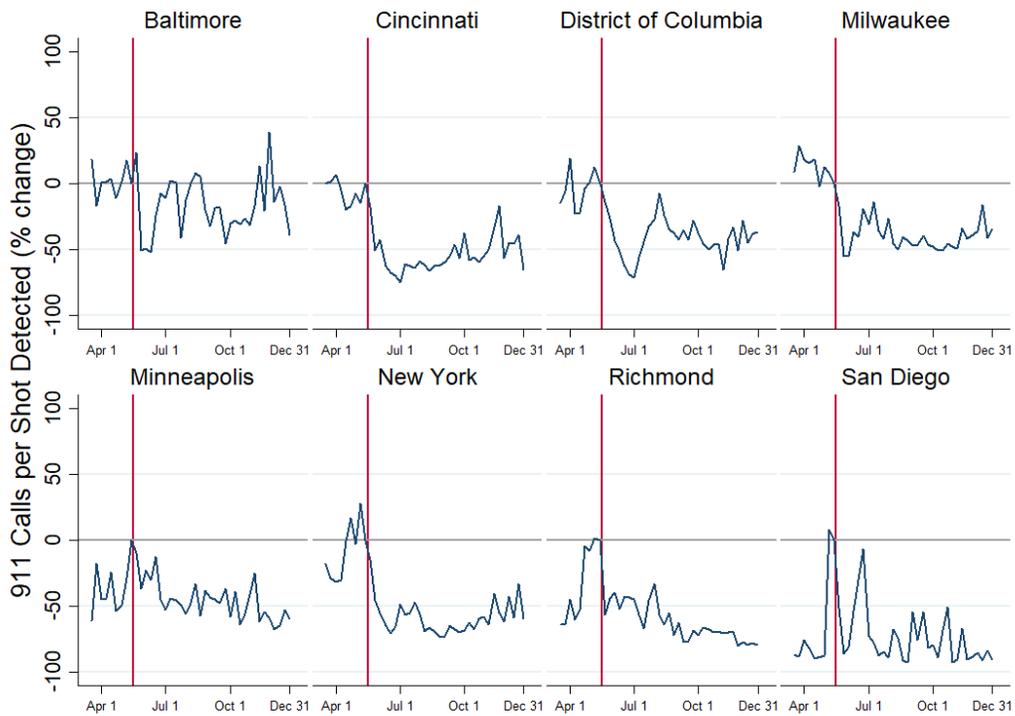


Figure III: Civilian Crime Reporting by City

Notes: Figure plots the percent change in the ratio of 911 calls to ShotSpotter shots over time by city. For each city, percent change is calculated relative to the call-to-shot ratio during the week prior to George Floyd's death. Sample is limited to weeks after the COVID-19 National Emergency was declared. Red vertical line represents the week of George Floyd's death.

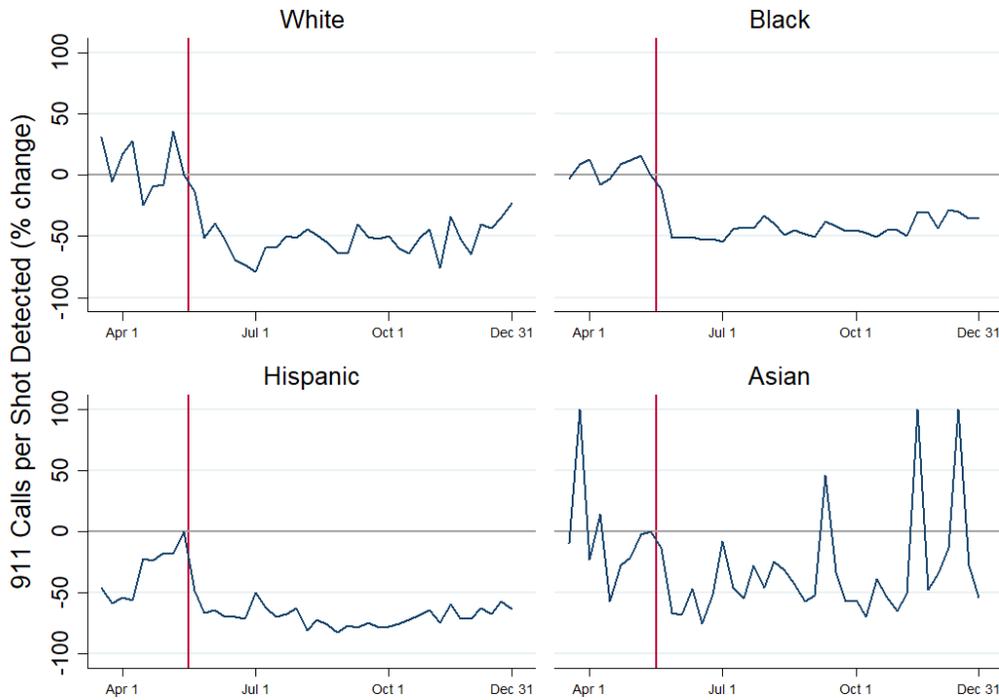


Figure IV: Civilian Crime Reporting by Neighborhood Race

Notes: Figure plots the percent change in the ratio of 911 calls to ShotSpotter shots over time by neighborhood racial composition. For example, the top-left figure aggregates 911 calls and ShotSpotter shots across all majority-white neighborhoods in the sample (i.e., Census tracts with >50% white residents in 2015-2019 ACS). For each neighborhood type, percent change is calculated relative to the call-to-shot ratio during the week prior to George Floyd's death. Due to noise from the small number of majority-Asian tracts in our sample, we censor percent changes in call to shot ratio for those neighborhoods at 100% in order to display all subfigures on the same scale. Sample is limited to weeks after the COVID-19 National Emergency was declared. Red vertical line represents the week of George Floyd's death.

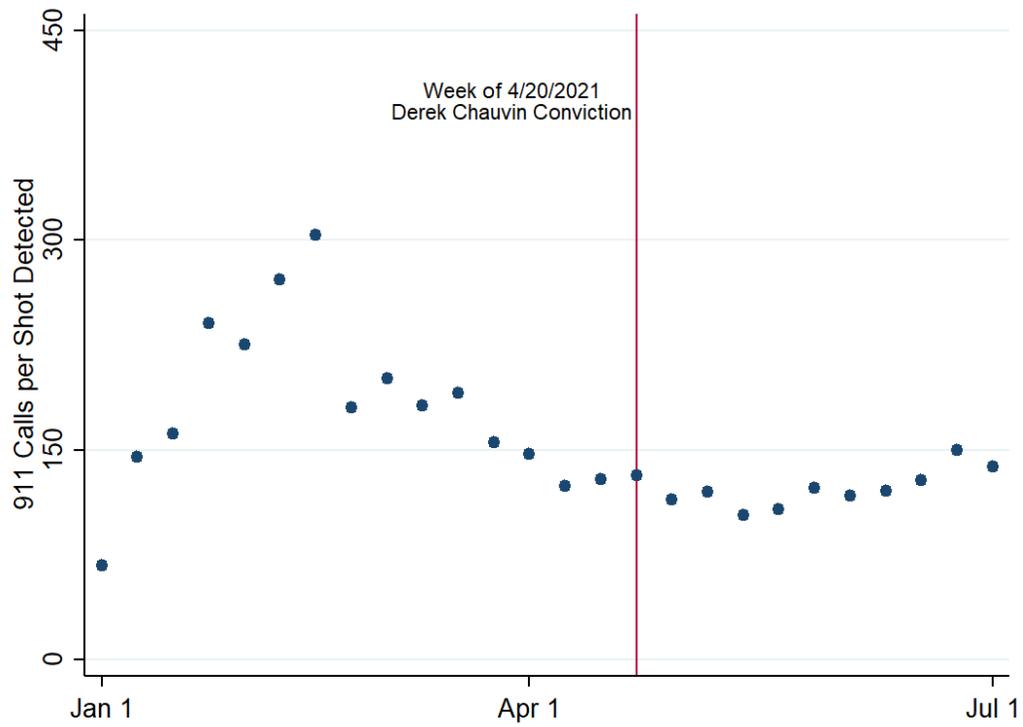


Figure V: Civilian Crime Reporting after Chauvin Conviction

Notes: Figure plots the ratio of 911 calls to ShotSpotter detected shots over time for January 1 to July 1, 2021. 911 calls and shots detected are aggregated by week across ShotSpotter coverage areas in all sample cities except Washington, DC (for which we only have ShotSpotter data until December 31, 2020). Red vertical line represents the week of Derek Chauvin's conviction.

Table I: Effects on Civilian Crime Reporting: Regression Discontinuity Model

	$DV=\ln(CallToShotRatio)$			
	(1)	(2)	(3)	(4)
Panel A: Main Results				
Post-Floyd	-0.481** (0.234)	-0.490*** (0.064)	-0.508*** (0.061)	-0.532*** (0.066)
City	-	Y	Y	Y
Seasonality	-	-	Y	Y
Mobility	-	-	-	Y
Obs.	1,051	1,051	1,051	1,051
Panel B: Heterogeneity by Neighborhood Race				
Post-Floyd	-1.053*** (0.352)	-0.800*** (0.261)	-0.554* (0.286)	-0.356 (0.321)
Race	White	Black	Hispanic	Asian
Obs.	382	838	421	113

Notes: Table shows regression discontinuity estimates from the following model: $\ln(CallToShotRatio_{c,d}) = \beta_0 + \beta_1 DaysToFloyd_d + \beta_2 PostFloyd_d + \beta_3 DaysToFloyd_d \times PostFloyd_d + \epsilon_{c,d}$. Standard errors are heteroskedasticity-robust. Observations contain the natural log of the total number of 911 calls divided by the total number of ShotSpotter shots in a city-date. The sample spans the 73 days between the COVID-19 National Emergency on March 13, 2020 and George Floyd's murder on May 25, 2020 plus the 73 afterwards. Panel A examines all calls and shots from ShotSpotter coverage areas in eight sample cities under various specifications. Column 1 includes no additional controls. Column 2 includes city fixed effects. Column 3 includes day of week fixed effects and day-level controls for national 911 call volume in 2019. Column 4 includes city-date level controls for the amount of time spent in places of residence based on Google tracking data. Panel B presents our base model results examining city-date-level 911 calls and ShotSpotter shots from majority-white (Column 1), majority-Black (Column 2), majority-Hispanic (Column 3) and majority-Asian (Column 4) Census tracts. Observations are missing if there were no detected shots (i.e., the denominator is zero) in a city-date (Panel A) or in a city-neighborhood type-date (Panel B).

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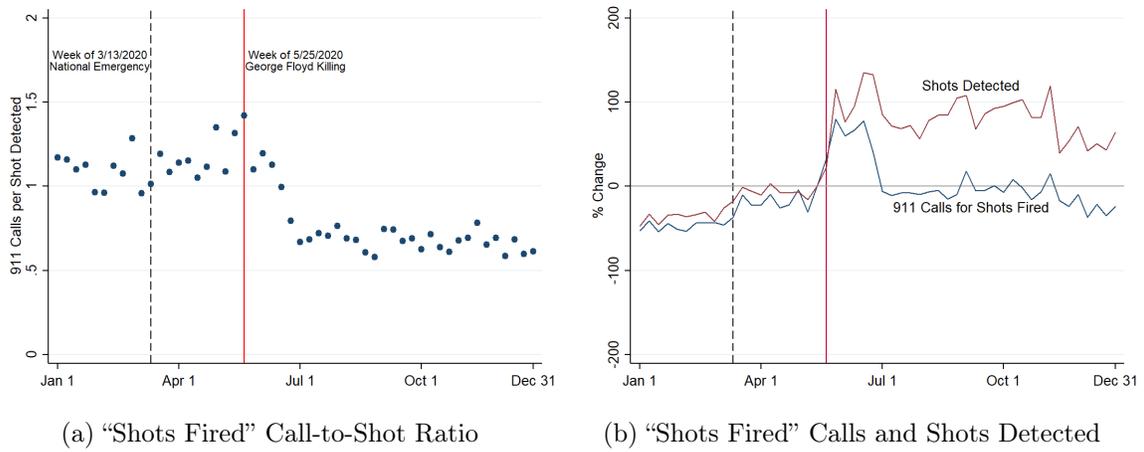
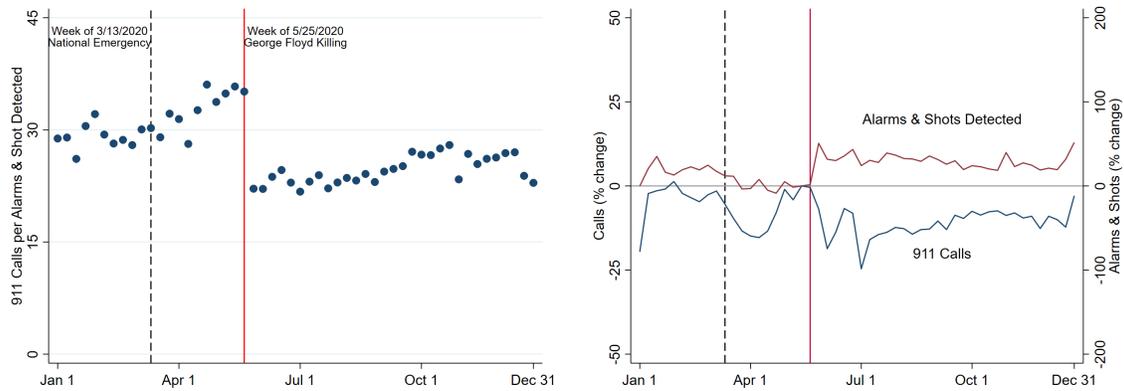


Figure A.I: Civilian Crime Reporting over Time ("Shots Fired" Calls to Shots Detected)

Notes: Panel A plots the ratio of 911 calls for "shots fired" to ShotSpotter detected shots over time. 911 "shots fired" calls and shots detected are aggregated by week across ShotSpotter coverage areas in all eight sample cities: Baltimore, Cincinnati, Washington (DC), Milwaukee, Minneapolis, New York, Richmond (California) and San Diego. Panel B plots the percent change in 911 calls for "shots fired" and ShotSpotter shots over time, relative to the value of each variable during the week prior to George Floyd's death. Dashed vertical line represents the week the COVID-19 National Emergency was declared. Red vertical line represents the week of George Floyd's death.



(a) 911 Calls to Shots Plus Alarms Ratio

(b) 911 Calls and Shots Plus Alarms

Figure A.II: Civilian Crime Reporting over Time (911 Calls to Shots Plus Alarms)

Notes: Panel A plots the ratio of 911 calls to the sum of ShotSpotter detected shots and automated alarms over time. 911 calls and shots detected plus automated alarms are aggregated by week across ShotSpotter coverage areas in all eight sample cities: Baltimore, Cincinnati, Washington (DC), Milwaukee, Minneapolis, New York, Richmond (California) and San Diego. Panel B plots the percent change in 911 calls and the sum of ShotSpotter shots and automated alarms over time, relative to the value of each variable during the week prior to George Floyd's death. Dashed vertical line represents the week the COVID-19 National Emergency was declared. Red vertical line represents the week of George Floyd's death.

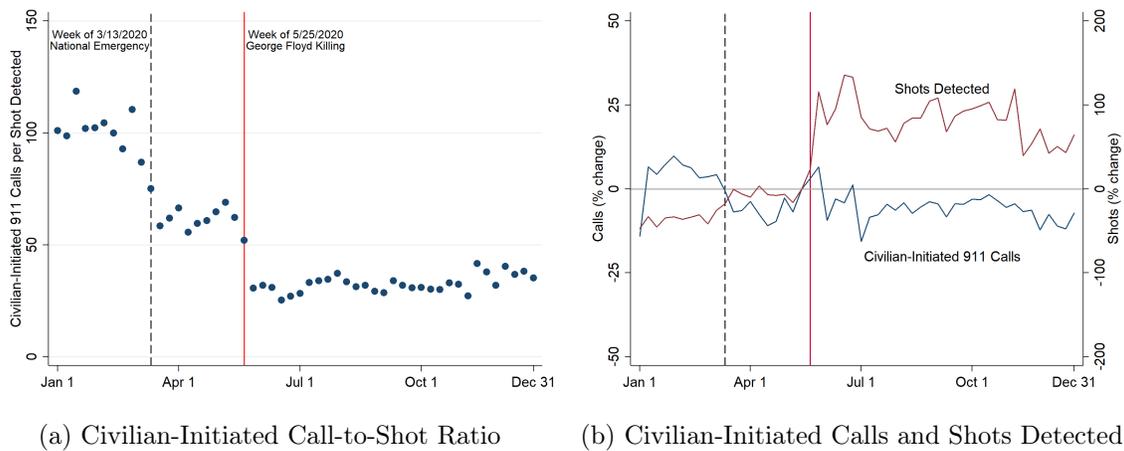


Figure A.III: Civilian Crime Reporting over Time (Civilian-Initiated Calls to Shots Detected)

Notes: Panel A plots the ratio of civilian-initiated 911 calls to ShotSpotter detected shots over time. To identify civilian-initiated 911 call volumes, we exclude calls with descriptions related to traffic stops and patrols, which may instead result from proactive policing encounters. Civilian-initiated 911 calls and shots detected are aggregated by week across ShotSpotter coverage areas in all eight sample cities: Baltimore, Cincinnati, Washington (DC), Milwaukee, Minneapolis, New York, Richmond (California) and San Diego. Panel B plots the percent change in civilian-initiated 911 calls and ShotSpotter shots over time, relative to the value of each variable during the week prior to George Floyd's death. Dashed vertical line represents the week the COVID-19 National Emergency was declared. Red vertical line represents the week of George Floyd's death.

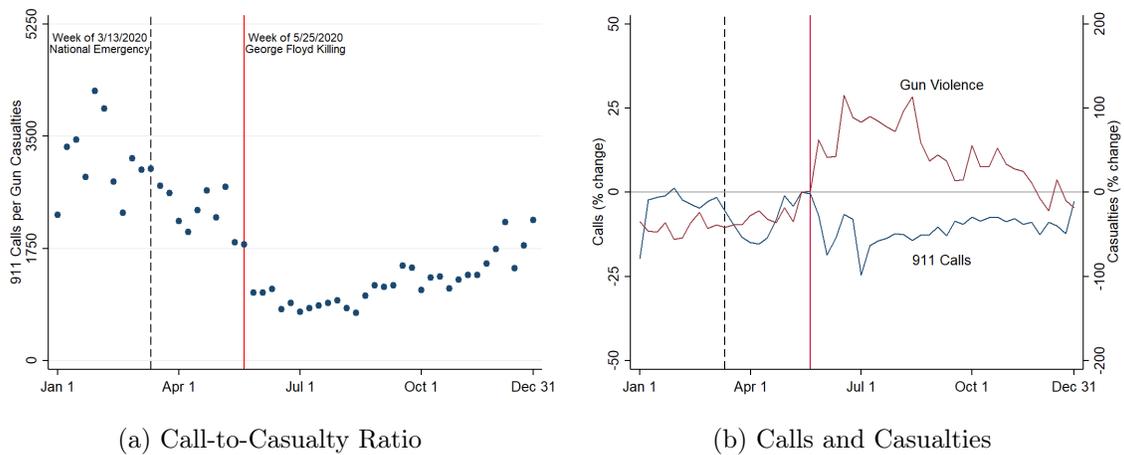


Figure A.IV: Civilian Crime Reporting over Time (911 Calls to Gun Violence Casualties)

Notes: Panel A plots the ratio of 911 calls to gun violence casualties (i.e. deaths and injuries) over time. Data on gun violence casualties come from the Gun Violence Archive (gunviolencearchive.org). 911 calls and gun casualties are aggregated by week across ShotSpotter coverage areas in all eight sample cities: Baltimore, Cincinnati, Washington (DC), Milwaukee, Minneapolis, New York, Richmond (California) and San Diego. Panel B plots the percent change in 911 calls and gun violence casualties over time, relative to the value of each variable during the week prior to George Floyd's death. Dashed vertical line represents the week the COVID-19 National Emergency was declared. Red vertical line represents the week of George Floyd's death.