Brooklyn Defenders

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December 2024 - Report

Confirmed: ShotSpotter Technology Increases Surveillance and Policing of Black and Latine New Yorkers, While Failing to Reduce Gun Violence

Nine years of previously undisclosed NYPD data reveals more than $54M wasted on unreliable gunshot detection technology

Introduction

In 2015, the New York Police Department (NYPD) unveiled a new pilot program aimed at responding to gun violence. Then-Mayor Bill de Blasio announced, "We are rolling out cutting edge technology to make the city safer."[1] Called ShotSpotter, the technology claimed to identify the location of gunfire using an array of microphones and computing that would be installed around the city. Nine years later, new data uncovered by Brooklyn Defender Services reveals that this extremely expensive technology failed to make New Yorkers safer.

Once installed, ShotSpotter's sensors are supposed to send an alert any time there is active gunfire in the city. NYPD officers are notified of that alert and deployed to the address identified by ShotSpotter. ShotSpotter and its supporters claim the technology improves identification of gunfire incidents and shortens police response times to gunfire across the five boroughs.[2]

Brooklyn Defender Services (BDS) has been investigating the NYPD's use of ShotSpotter for the last five years. In January 2024, we submitted a Freedom of Information Law (FOIL) request to the NYPD, asking for the Department's ShotSpotter performance data. After eight months and an administrative appeal, we received a response from the NYPD that **disclosed nine years' worth of individual ShotSpotter alerts.** [3]

This is the largest disclosure of ShotSpotter performance data to date from any city.

An analysis of this new, much-larger dataset led us to several troubling discoveries about ShotSpotter that are consistent with major findings in other cities (like Chicago[4] and Atlanta[5]) and from public officials including the New York City Comptroller.[6]

Here are three new major takeaways visible in NYPD's data:

1. **NYPD has been tracking ShotSpotter's performance since 2015 but has continued to expand the technology's use despite consistently poor performance.** Over nine years, the system's confirmation rate—the rate at which the department can corroborate the accuracy of a ShotSpotter alert—has been just **16.57%.** NYPD never disclosed this tracking before we received this FOIL response, nor did it publicly disclose how poorly ShotSpotter performed. Instead, the NYPD expanded, extended, and renewed its contract with the company. NYC's current ShotSpotter contract is set to expire this month. Despite their internal data, the Comptroller's audit report, and developments in other major cities across the country like Chicago and Atlanta, NYPD appear to be on course to renew.
2. **Over 99% of ShotSpotter's alerts did not lead to the recovery of guns or identification of those involved in gun violence, costing taxpayers millions to fail at its stated purpose.** According to the NYPD's own data, less than 0.9% of responses to ShotSpotter alerts resulted in NYPD recovering a firearm, and only 0.7% of responses resulted in NYPD making an arrest for alleged illegal activity of any kind.
3. **ShotSpotter's sensors — which are disproportionately located in neighborhoods with higher numbers of Black and Latine residents — report a staggeringly high number of unconfirmed alerts, leading to an increase in surveillance and policing.** The NYPD tracking data reveals a stark (and unfortunately predictable) truth: armed NYPD officers are far more likely to be dispatched to Black and Latine neighborhoods in response to these largely false alerts than to predominantly white neighborhoods.

Our findings come on the heels of a major audit of NYPD's use of ShotSpotter from New York City's own Comptroller. In June 2024, that office released an audit report ("Comptroller Report") documenting their audit and findings.[7] After their review of portions of NYPD data from 2022 and 2023, the Comptroller found the system to be inaccurate, ineffective, and overpriced. Given the audit's findings, the Comptroller recommended that NYPD not renew its contract with ShotSpotter.[8]

BDS obtained this FOIL response data after the publication of the Comptroller Report.[9] The revelations exposed by NYPD's complete dataset further underscore the Comptroller Report's conclusion: With the contract set to expire, the data show that New York City should refuse to renew the contract and end its relationship with ShotSpotter once and for all.

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This report was prepared by Brooklyn Defender Services. Data analysis and visualizations by Andrew Foltz-Morrison, with support from Max Behrman and Aaron Siegel. The report was written by Elizabeth Daniel Vasquez, former director of Brooklyn Defenders' Science and Surveillance Project and co-founder of the Forensic Evidence Table, with support from Jackie Gosdigian. Please direct any inquiries on this report to dball@bds.org.

Takeaway #1: NYPD's own data demonstrate ShotSpotter's consistently poor performance.

ShotSpotter's confirmation rate has been low for its entire duration of use in NYC.

Our analysis of NYPD's dataset reveals, when the NYPD investigates a ShotSpotter alert, they find nothing to confirm that gunfire occurred **83.43%** of the time.

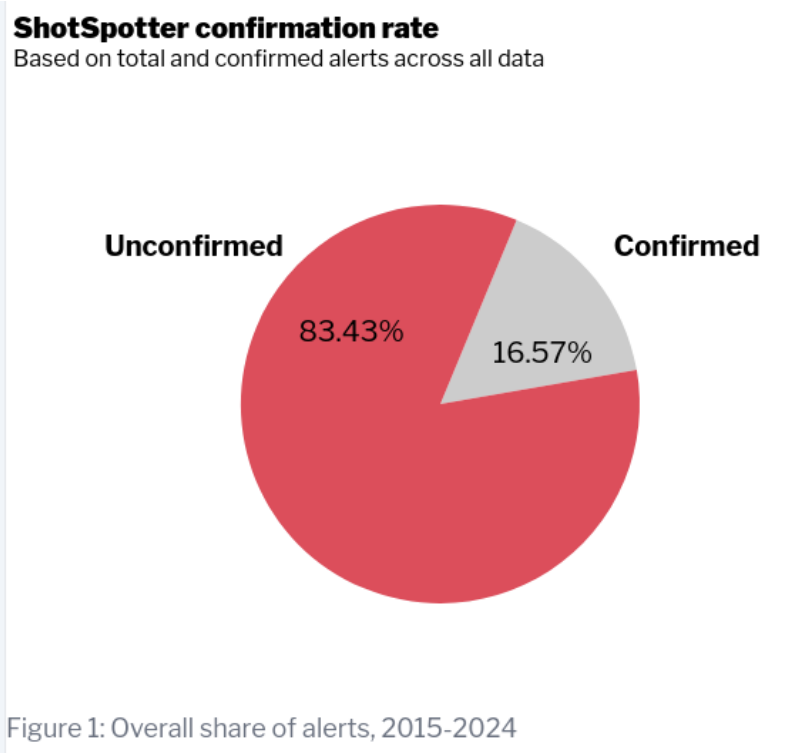

Figure 1: Overall share of alerts, 2015-2024

When NYPD responds to a ShotSpotter alert, NYPD's Operations Division records the result of that response in a spreadsheet. Recorded alerts are then labeled either "TRUE" – confirmed – or "FALSE" – unconfirmed – in a specific column based on their investigation.[10] Alerts are "confirmed," for example, if NYPD received a 911 call reporting gunfire; responding officers located cartridge casings, bullet/bullet fragments, or property damage consistent with gunfire at the scene; a person sustained a gunshot wound; or surveillance video was recovered that documented gunfire.

More than 62,000 times over 9 years NYPD responded to a ShotSpotter alert and then coded that alert as FALSE, indicating that it was unconfirmed.

Our findings are consistent with the Comptroller Report's findings, which examined a smaller amount of New York City data over a more limited time span.[11]

The NYPD dataset reviewed by Brooklyn Defenders spans a broader range of time than any previously disclosed dataset across all cities where ShotSpotter operates.

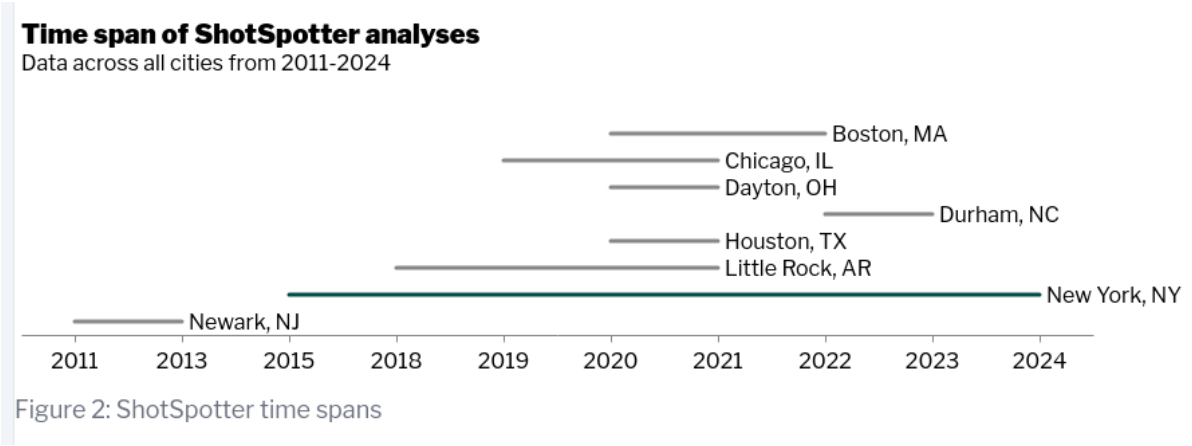

Figure 2: ShotSpotter time spans

Data for each city cited below.[12] [13] [14] [15] [16] [17] [18]

Our findings also demonstrate that this low confirmation rate is remarkably stable across time. ShotSpotter has had a shockingly low confirmation rate for its entire duration of use.

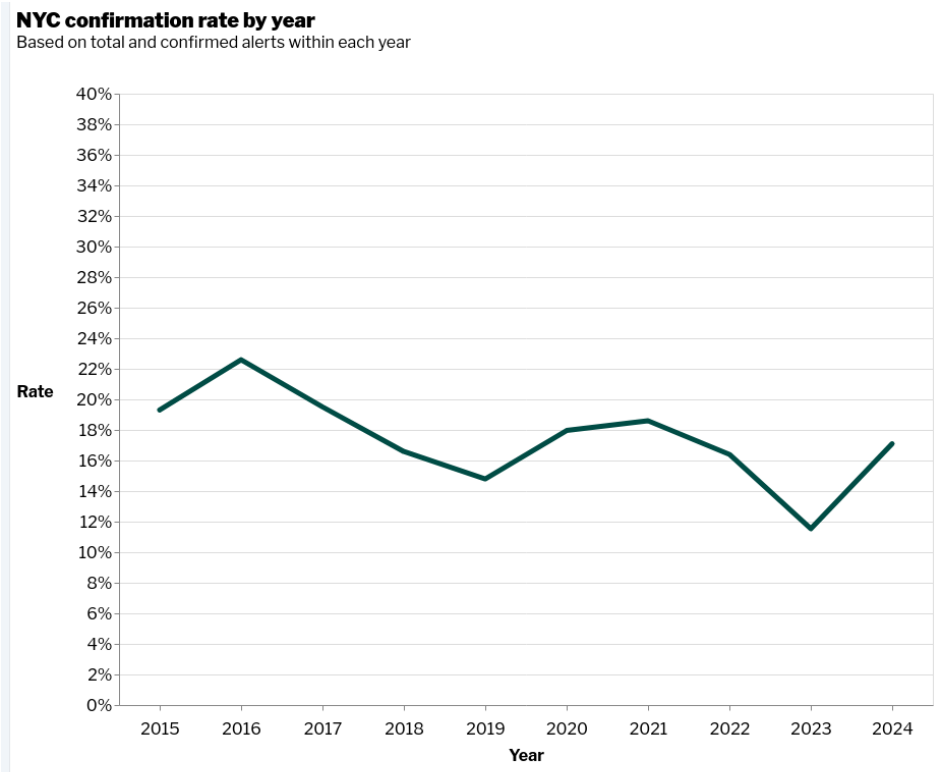

Figure 3: Year-over-year data shows that confirmation rates in NYC vary but hold steady below 20%

NYPD's data demonstrates that ShotSpotter's low confirmation rate is also consistent across cities and responding police departments.

New York is not an outlier. New York, alongside Chicago, Boston, and Houston is surveilled by a ShotSpotter system that, as described by the MacArthur Justice Center, "generates a huge proportion of unfounded deployments that turn up no evidence of gun crime."[19]

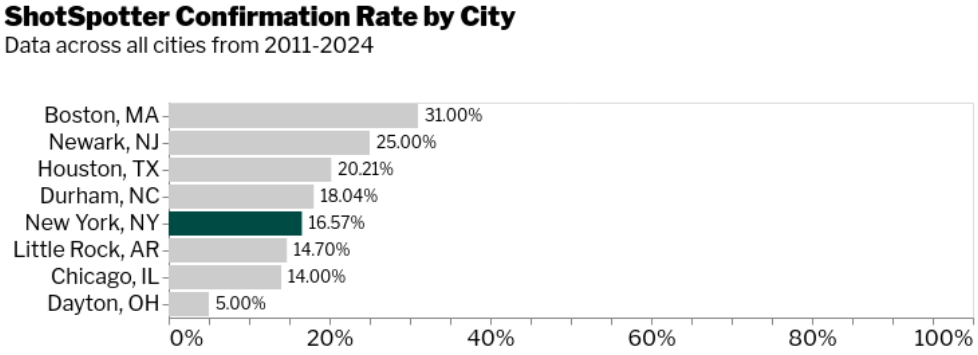

Figure 4: Comparison of ShotSpotter confirmation rates across cities

ShotSpotter has recently suggested that their low confirmation rates are a function of police response failures, and not a reflection of the technology's accuracy.[20] This argument is severely undermined by the consistency of law enforcement's experience with the technology across geographies and departments.

Despite this abysmal track record, NYPD failed to share its data with the public for nine years.

The Comptroller recommended that NYPD increase transparency by "collect[ing] and publish[ing] relevant data, including the number of published alerts, percentage of alerts which result in confirmed shootings, [and] the number of false negatives and missed incidents[.]"[21]

Conclusions about ShotSpotter's confirmation rate are not difficult to calculate, if the data is tracked. In New York, NYPD apparently tracked this important data from the beginning of its pilot program with the company.

The NYPD dataset Brooklyn Defenders received is the Operations Division's purpose-built report for tracking ShotSpotter alerts.[22] The dataset shows that the Division started tracking this data in 2015, the year New York City piloted ShotSpotter technology for the first time.[23]

It has now become clear that NYPD does, in fact, collect this highly relevant data. NYPD just failed to publish it. By keeping this information from the public and from stakeholders for *nine* years, NYPD not only undermined transparency, but also skirted accountability for the worst excesses of this failing technology.

Takeaway #2: ShotSpotter does not increase gun recovery, or the identification of people involved in gun crime.

New York City's very expensive investment in ShotSpotter has had a negligible impact on the recovery of firearms or the identification of people involved in gun crime.

Over the 9 years, 4 months, and 24 days of ShotSpotter data NYPD disclosed to Brooklyn Defenders, the Department responded to over 75,000 ShotSpotter alerts.

Of those, a mere **0.8% of alerts** resulted in the recovery of even a single firearm.

A mere **529 alerts** out of more than 75,000 resulted in a person being arrested by NYPD for any crime.[24] This is only **0.7% of all alerts**, and the offenses underlying those arrests were often not for gun-related activity. NYPD's data includes multiple arrests for "disorderly conduct" and other petty offenses.

The Comptroller noted that NYPD incentivized false positives, thus incentivizing more alerts and more police deployments based on false pretenses.[25]

As noted in the Comptroller Report, NYPD and ShotSpotter use the following formula to monitor ShotSpotter's accuracy, and thus performance:

$$\frac{Published\ incidents}{(Published\ incidents + missed\ incidents + false\ negatives)}$$

False positives, or unconfirmed alerts, do not appear in the denominator of this formula, so they do not negatively impact ShotSpotter's "performance" as defined here. Because the same number – published incidents, which includes false positives – appears in both the numerator and the denominator of this formula, the best way to get this number as close to 100% is to publish as many alerts as possible.

The failure to incorporate a penalty for alerts that were unconfirmed means that the NYPD incentivizes *more* alerts — resulting in more police deployments to areas with ShotSpotter sensors.

NYC spends tens of millions of dollars on ShotSpotter alerts that result in nothing.

In nine years, NYC spent $45,552,780 of the ShotSpotter contract on alerts that send officers on the proverbial goose chase, responding to locations (with all that response entails) to find no firearms and to make no arrests.

This figure only pays for the time-wasting alerts; it does not include the additional monetary cost of officer hours spent on each dispatch, as outlined in the Comptroller's audit report.

Unconfirmed alerts, alone, the Comptroller Report estimates, lead to about 100 hours per week — over 5,000 per year — in additional police deployments to neighborhoods with ShotSpotter sensors. The Comptroller estimated that unconfirmed alerts eat up 36 twelve-hour work shifts of officer time per month.[26] The total number of officers who are assigned to each of those 36 twelve-hour shifts is unknown. NYPD's personnel budget must absorb this cost. Given the number of hours, it is reasonable to assume this adds at minimum hundreds of thousands of dollars to NYPD's personnel budget each year.[27]

Takeaway #3: ShotSpotter increases the surveillance and policing of Black and Latine neighborhoods.

Takeaway #2 might suggest that the cost to New York City of ShotSpotter's inaccuracy can be measured merely as waste of NYPD time and taxpayer money, but the impact on New York City communities is more profound.

ShotSpotter alerts deploy officers to NYC neighborhoods almost 22 times per day on average.

When a ShotSpotter alert occurs, NYPD officers are notified of that alert and deployed to the address identified by ShotSpotter.

The responding officers are told that they are responding to an alert for active gunfire.

According to the NYPD's dataset, over its more than nine years in operation, ShotSpotter has alerted in New York City 75,266 times.

This means that, over those years, the system has gone off **21.91 times per day** on average.

Almost 22 times per day, NYPD officers receive an alert from ShotSpotter, turn on their lights and sirens, mentally prepare themselves to respond to active shooting, and drive rapidly into New York's neighborhoods.

More than 83% of the time, when those officers arrive, they will find *nothing*.

This means that a little more than 18 times each day, every day, NYPD officers go through this exercise and communities experience this kind of armed response fruitlessly.

ShotSpotter's inaccuracy predictably increases around major holidays and times of community celebration.

ShotSpotter is known to struggle with differentiating gunfire from other loud percussive noises, like fireworks and engine backfires.

An analysis of ShotSpotter data by the ACLU of Massachusetts found that "**16 percent of alerts** corresponded to common urban sounds: fireworks, balloons, vehicles backfiring, garbage trucks and construction."

Over 1 in 10 ShotSpotter alerts in Boston were just fireworks, despite a 'fireworks suppression mode' that ShotSpotter implements on major holidays.[28]

The NYPD data Brooklyn Defenders analyzed also demonstrates this: ShotSpotter alerts **increase by 200-250% around July 4th**, and **by 175-375% around New Year's Eve**. Its **confirmation rate correspondingly drops** in a predictable fashion around these dates, as this seasonality chart shows:

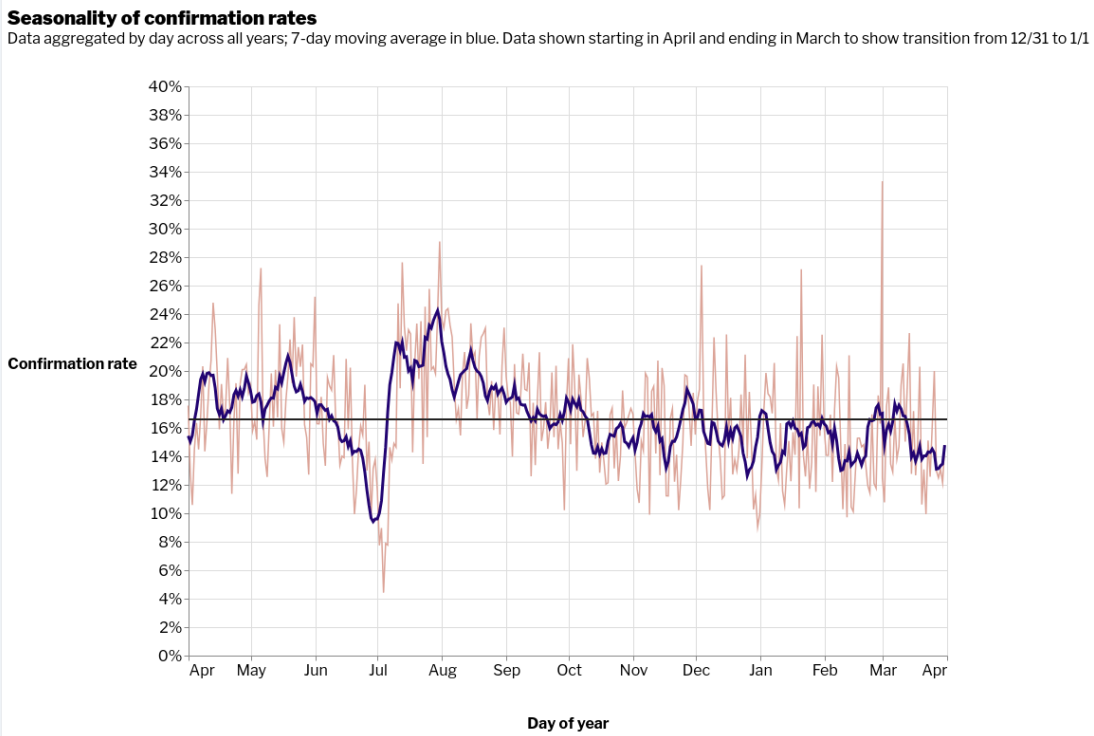

Figure 5: ShotSpotter daily confirmation rate with 7-day moving average

The NYPD's recently disclosed dataset reveals that Black and Latine New Yorkers bear the overwhelming brunt of ShotSpotter-related police deployments.

ShotSpotter has a higher average number of alerts in precincts where Black and Latine residents make up the largest share of the population, as the chart below shows.

These alerts mean those neighborhoods are exposed to more surveillance and more police contact – and those officers are expecting to encounter potential gun violence even when none has taken place.

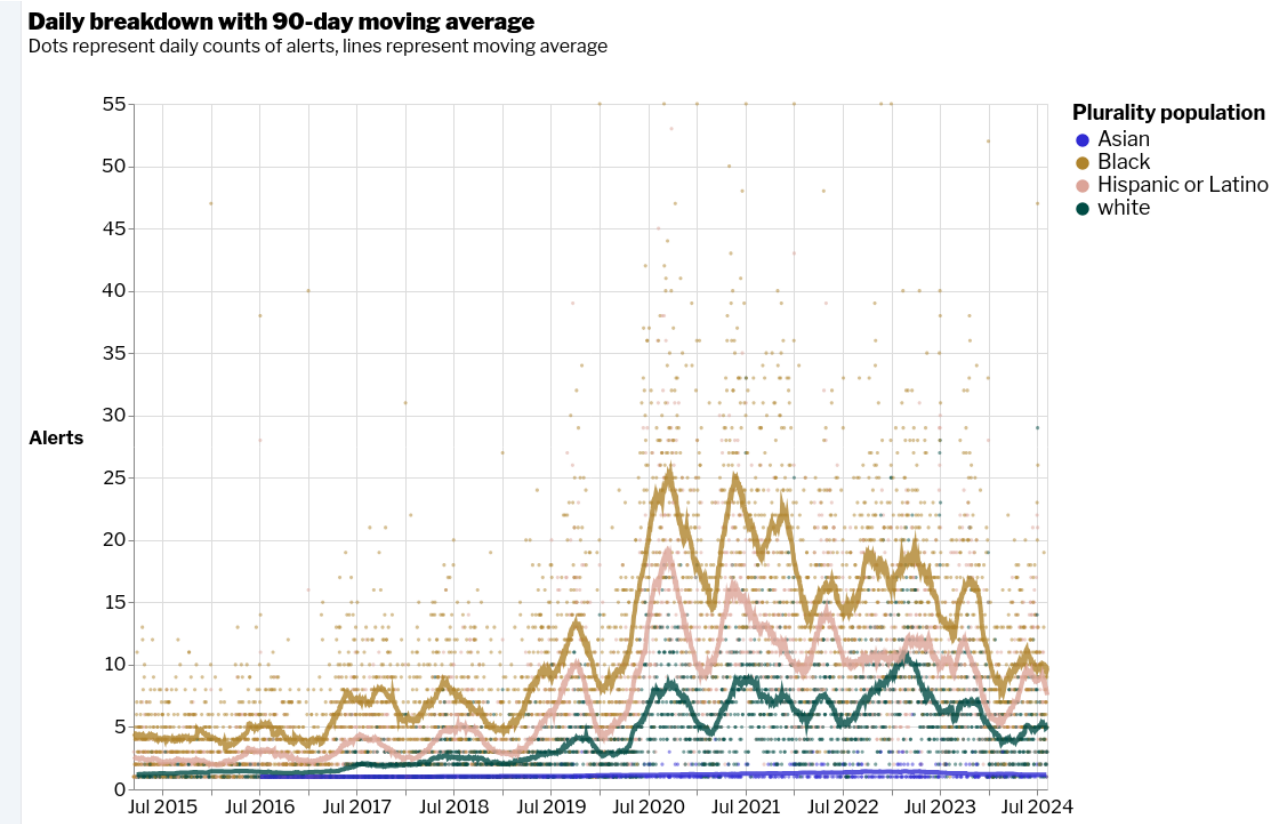

Figure 6: Total ShotSpotter alerts per day, grouped by precinct plurality population, 2015-present

ShotSpotter's extremely high rate of unconfirmed incidents means police are routinely deployed to majority Black and Latine neighborhoods under false pretenses. This disparity can be observed by comparing a map of unconfirmed incidents against the precincts' demographic makeups:

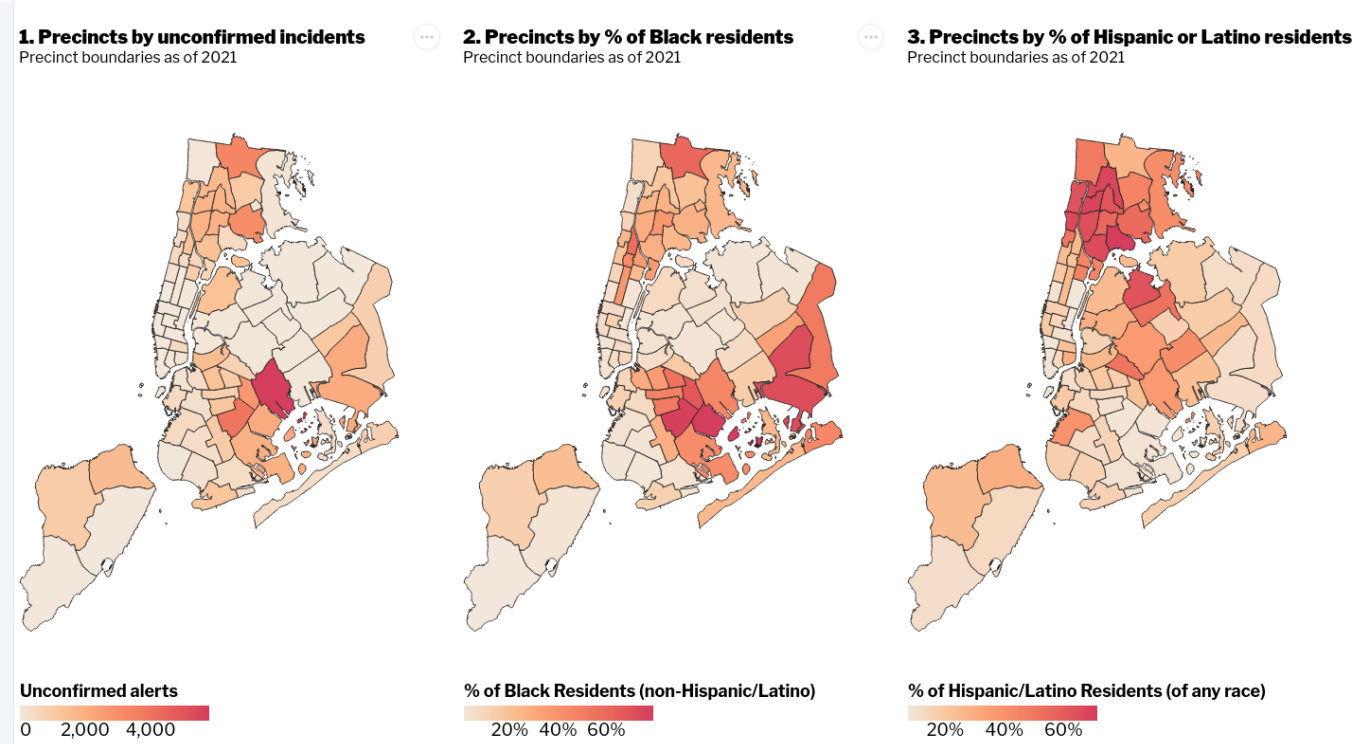

Figure 7: Comparison of ShotSpotter alert data with neighborhood demographics

Map 1: The prevalence of unconfirmed incidents correlates with the proportion of Black and Latine residents in each precinct.
Map 2: Percentage of Black (non-Hispanic) residents by precinct.
Map 3: Percentage of Hispanic/Latino residents by precinct.

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The disparity can be more directly observed by looking at the counts of unconfirmed alerts in a side-by-side comparison.

Adjusting each precinct for the relative share of the population using census data, the FOIL response data revealed that **Black residents in the city live in the same police precinct as 93% *more* unconfirmed alerts than the citywide average.** That is an almost two-fold difference in policing. Conversely, **white and Asian residents live in the same precinct as 50% *fewer* unconfirmed alerts than the citywide average.** (*See* Figure 8)

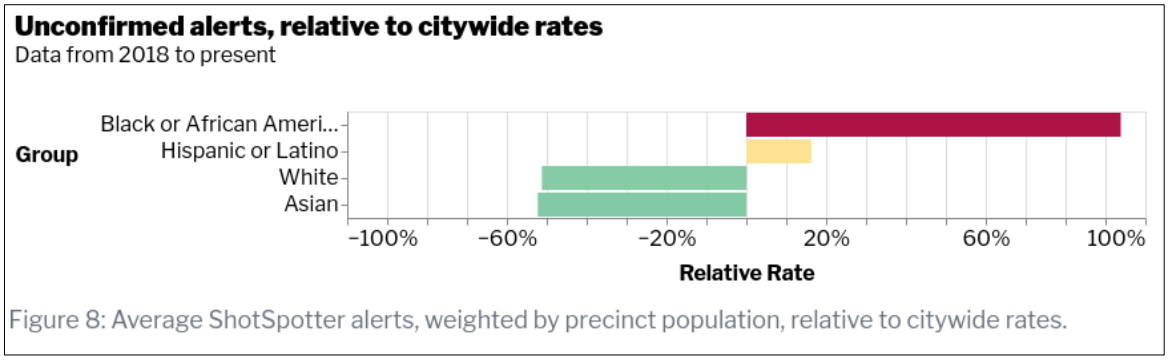

Figure 8: Average ShotSpotter alerts, weighted by precinct population, relative to citywide rates.

Based on the FOIL response data, BDS determined that Black residents in New York City live in proximity to 93% more unconfirmed alerts than the city average. The opposite is true for Asian and white residents, who live in proximity to 50% fewer unconfirmed alerts.

Taken together, this means that you are over 3.5 times more likely to have an officer deployed within your precinct based on an unconfirmed alert if you live in a precinct with predominantly Black residents than if you live in a neighborhood with predominantly white residents.

Recent reporting has also demonstrated that ShotSpotter sensors are disproportionately placed in Black and Latine neighborhoods.

As reported by Dhruv Merota and Joey Scott in Wired magazine, "nearly 70 percent of people [nationwide] who live in a neighborhood with at least one SoundThinking sensor identified ... as either Black or Latine."[29] This is true for New York City.

While Black, non-Hispanic individuals constitute 20.2% of the New York City's total population,[30] they make up 33.1% of the residents in areas monitored by ShotSpotter sensors.[31]

The same is true for Latine individuals, who make up 28.3% of the population[32] but represent 33.4% of the residents in areas covered by ShotSpotter.[33]

Taken together, Black and Latine individuals make up 2/3 of the New Yorkers who live in areas surveilled by ShotSpotter.

NYPD's data demonstrates that the constant rate of unconfirmed alerting multiplies the influx of false alert responses in predominantly Black and Latine neighborhoods.

Putting this all together: the city-wide average number of total alerts per day was around 22. Of those 22 alerts, an average of 18.1 alerts per day sent officers to predominantly Black and Latine neighborhoods. Officers spent on average about 9 hours in those neighborhoods in response to each alert. And 82.6% of those alerts were unconfirmed.

ShotSpotter's sensors are not placed evenly throughout the city: neighborhoods with predominantly Black residents tend to have twice as many sensors as neighborhoods with predominantly white residents. For precincts with both predominantly Black and predominantly Latine residents, all but one have sensors – compared to eight predominantly white precincts with no ShotSpotter sensors at all. ShotSpotter claims its sensor placements are based on the purported locations of gunfire, but this justification is dubious.

As the MacArthur Justice Center explains: "The predominantly Black and Latinx neighborhoods where ShotSpotter operates will have inflated gunfire statistics because of the enormous number of unfounded ShotSpotter alerts."[34] ShotSpotter can only hear alerts where microphones exist – so the bias in placement translates into a bias in the data, which our charts above show. The MacArthur Justice Center describes this as "a false 'techwash' justification for racialized and oppressive patter[n]s of policing in communities of color."[35]

Moreover, attempting to "correct" this bias by placing sensors more evenly across the city would merely serve to waste even more taxpayer dollars on unfounded alerts. As illustrated by both this data and by the Comptroller's report, ShotSpotter's confirmation rate varies somewhat by time and location, but generally does not exceed 20%. Trying to correct this bias by expanding ShotSpotter's coverage would simply multiply the number of unconfirmed alerts across even more parts of the city.

The way to prevent a biased system from producing biased outcomes is to stop using it, not to expand it.

Conclusion

The NYC Comptroller Report's findings and Brooklyn Defenders' analysis of the FOIL response data are consistent with analyses from other cities, which have also found that ShotSpotter's confirmation rates are staggeringly low.[36]

NYPD has been aware of this for nearly a decade.

Like so many of NYPD's other massively expensive and invasive technologies, ShotSpotter is an engine for over-policing that leads to an influx of police in Black and Latine neighborhoods based on false gunshot alerts.

Essentially, ShotSpotter functions like an unreliable informant, with police using its alerts to justify stop-and-frisks without legal justification. This pattern not only leads to unjustified stops, but also increases the chance that police responding to an alert will respond with hypervigilance, raising the risk of escalation during interactions that are based on faulty information.

While technological tools like ShotSpotter are marketed as simple ways to increase NYPD efficiency, these tools fundamentally alter the landscape of policing and surveillance, disproportionately burdening communities that are already facing the brunt of police interaction and violence.

Given the tool's lack of reliability and high price tag, NYPD should *not* renew its contract for this tech — instead, the city should use this $50M+ investment on efforts that actually make our communities safer: education, health, poverty reduction, cure-violence programs, and other such resources.

ShotSpotter has no place in our communities, and it's time to put an end to its use in NYC.

Appendix I: Methodology

BDS based this report on NYPD data documenting 75,266 ShotSpotter alerts, spanning from March 16, 2015, to August 9, 2024.

The NYPD dataset included designation of:

- Pct - "Incident precinct"
- Numb Firearm Recovered - "Number of firearms recoved [sic] if any"
- Numb Arrests - "Number of Arests [sic] if any"
- Confirmed - "Whether the shots fired was confirmed by the responding NYPD unit, based on collected evidence."

The confirmation rate, whether for the entire time span, as in Figures 1 and 3, or shorter segments, as in Figures 2, 5, and 6, was calculated by dividing the total number of alerts by the number of alerts that listed "TRUE" in the Confirmed? Column, matching the NYPD's self-designation. We did not attempt to correct any errors in the "Confirmed?" column by referencing other data: for this report, we rely only on what the NYPD chose to report in the spreadsheet they provided to us.

To calculate the arrest and firearm recovery rates, we divided the number of rows with non-zero values for "Numb Arrests" and "Numb Firearm Recovered," respectively, by the total number of alerts. The figure for the percentage of alerts that resulted in a firearm recovery or arrest was calculated by taking the number of rows with non-zero values for either of those above columns and dividing it by the total number of alerts.

We multiplied ShotSpotter's total cost of $54.6 million by the percentage of unconfirmed alerts (83.43%) to obtain the $45,552,780 dollar figure.

The Comptroller's report gives an average of 30 minutes spent on investigation per alert – to track total time spent on unconfirmed alerts, we multiplied 30 by the number of unconfirmed alerts and then converted to hours to obtain the average number of hours spent per month on those alerts.

The seasonality analysis in Figure 5 was created by computing both the total and the number of unconfirmed ShotSpotter alerts for each distinct day of the year. This day-of-year data was then shown for an annual period beginning in April and ending at the end of March, with a 7-day rolling average of the daily confirmation rate.

We performed spatial and demographic analysis of ShotSpotter alerts by using John Keefe's data,[37] which assigns individual census blocks to NYPD precincts based on their boundaries.

We joined the alert-level data to Keefe's precinct-level data by using the precinct ID number as a key.

Variables from the decennial census give the estimated number of residents of each block (and thus precinct), in total and subtotals based on respondents' self-reported race or ethnicity. The variable identifiers used in this analysis were:

- P1_001N – Total population
- P2_002N – Total number of residents who identify as Hispanic or Latino, of any race
- P2_005N – Total number of residents who identify as white alone, and who do not identify as Hispanic or Latino
- P2_006N - Total number of residents who identify as Black or African American alone, and who do not identify as Hispanic or Latino
- P2_008N - Total number of residents who identify as Asian alone, and who do not identify as Hispanic or Latino

The plurality population listed in Figure 6 was obtained by taking the largest count for each census variable for each precinct, apart from total population. To obtain the relative percentages of the populations used in maps 2 and 3, we divided the counts for P2_006N and P2_002N respectively by the total count of P1_001N.

The daily breakdowns for each demographic group were taken by grouping the alert data by the date of the alert plurality population of the precinct where the alert was reported, then computing the total alerts for each group for each day. We then plotted those daily counts alongside a 90-day moving average to show the alerts per day across all 4 groups.

To produce maps 1, 2 and 3 in Figure 7, BDS examined precinct-level demographic information from the 2020 census to determine the percentage of the total population of Black, Hispanic or Latino (of any race), and white individuals in each precinct.

To compare the number of alerts by population in Figure 8, we used these five variables to weight the number of unconfirmed alerts in each precinct by population and compared each subgroup to the citywide average across the entire population.

The number of ShotSpotter sensors in each precinct was calculated using the sensor locations published by Wired (cited below).

* * *

End Notes

[1] Colleen Long, *NYPD Unveils Shot Spotter Pilot Program to Reduce Crime,* NBC NEW YORK (Mar. 16, 2015, 8:49 PM) https://www.nbcnewyork.com/news/local/nypd-unveils-shot-spotter-pilot-program-to-reduce-crime/2017791/

[2] *Id.*; *see also* Dhruv Mehrotra & Joey Scott, *Here Are the Secret Locations of ShotSpotter Gunfire Sensors*, WIRED (Feb. 22, 2024, 8:18 PM), https://www.wired.com/story/shotspotter-secret-sensor-locations-leak/.

[3] The spreadsheet data that BDS received in response to our FOIL request included entries for ShotSpotter alerts between March 16, 2015 and August 9, 2024.

[4] https://www.macarthurjustice.org/shotspotter-generated-over-40000-dead-end-police-deployments-in-chicago-in-21-months-according-to-new-study/

[5] https://www.scribd.com/document/524249684/Atlanta-Internal-Report-about-ShotSpotter

[6] OFFICE OF THE N.Y.C. COMPTROLLER, AUDIT REPORT ON THE NEW YORK CITY POLICE DEPARTMENT'S OVERSIGHT OF ITS AGREEMENT WITH SHOTSPOTTER INC. FOR THE GUNSHOT DETECTION AND LOCATION SYSTEM 4–5 (2024) [hereinafter COMPTROLLER REPORT], https://comptroller.nyc.gov/wp-content/uploads/documents/FP23-074A.pdf.

[7] IBID

[8] *See* COMPTROLLER REPORT, at 22.

[9] COMPTROLLER REPORT, at 9 ("[To] assess [ShotSpotter's] ability to identify confirmed shooting incidents …, the auditors reviewed the data in NYPD's ShotSpotter Tracking report (OCD report) to determine the correlation between ShotSpotter alerts and confirmed shooting incidents during sampled months of Fiscal Year 2023."); *see also id.* at 1 (stating the comptroller analyzed two data sets, one of which was the "NYPD's internal OCD ShotSpotter Tracking report").

[10] See Appendix I: Methodology for additional details.

[11] COMPTROLLER REPORT, at 9.

[12] Julie Lee, *Boston Police Records Show Nearly 70 Percent of ShotSpotter Alerts Led to Dead Ends*, ACLU OF MASSACHUSETTS (Apr. 8, 2024), https://data.aclum.org/2024/04/08/boston-shotspotter/

[13] Police Department, City of Durham, North Carolina, ShotSpotter Alert Dashboard, last updated Mar. 30, 2023 (last accessed Nov. 25, 2024).

[14] *ShotSpotter Generated Over 40,000 Dead-End Police Deployments in Chicago in 21 Months, According to New Study,* MACARTHUR JUSTICE CENTER (May 3, 2021) https://www.macarthurjustice.org/shotspotter-generated-over-40000-dead-end-police-deployments-in-chicago-in-21-months-according-to-new-study/ (last accessed Nov. 25, 2024).

[15] Mawa Iqbal, *ShotSpotter Generates Thousands Of Alerts In Dayton, But Officers Find Few Crimes,* WYSO, (Oct. 4, 2021) https://www.wyso.org/local-and-statewide-news/2021-10-04/shotspotter-generates-thousands-of-alerts-in-dayton-but-officers-find-few-crimes (last accessed Nov. 25, 2024).

[16] *ShotSpotter Pilot Program*, HOUSTON POLICE DEPARTMENT, SOUTHEAST PATROL DIVISION, October 2021 https://www.houstontx.gov/council/committees/pshs/20211021/Shotspotter-Pilot-Program.pdf (last accessed Nov. 25, 2024)

[17] Susan El Khoury, *FOX16 Investigates: Little Rock police push to keep ShotSpotter devices even with questionable results*, FOX16, Feb. 11, 2021 https://www.fox16.com/news/investigates/fox16-investigates-

little-rock-police-push-to-keep-shotspotter-devices-even-with-questionable-results/ (last accessed Nov. 25, 2024)

[18] Sarah Gonzalez, *In Newark, Gunshot Detection System Falls Short of Booker's Claims*, WNYC, Aug. 9, 2013 https://www.wnyc.org/story/311533-gunshot-detection-sensors-newark-result-17-arrests-over-three-years/ (last accessed Nov 25, 2024).

[19] *End Police Surveillance: Research Findings,* MACARTHUR JUSTICE CENTER, https://endpolicesurveillance.com/research-findings/ (last accessed Sept. 24, 2024).

[20] *SoundThinking Responds to New York City Comptroller Audit Report; Refutes Misleading Conclusions*, SOUNDTHINKING, July 17, 2024. https://www.soundthinking.com/wp-content/uploads/2024/07/SoundThinking-Reponse-letter-to-NYC-Comptroller_11JUL2024_FINAL.pdf

[21] COMPTROLLER REPORT, at 23.

[22] *See* COMPTROLLER REPORT, at 9 ("NYPD's Operations Division maintains the [ShotSpotter Tracking] OCD report to track ShotSpotter data, including the number of alerts and confirmed shootings.").

[23] *See supra* note 4.

[24] See Appendix I: Methodology for additional details.

[25] COMPTROLLER REPORT, at 9.

[26] COMPTROLLER REPORT, at 11-13.

[27] New York City Council Finance Division, *Report on the Fiscal 2025 Preliminary Plan and the Fiscal 2024 Preliminary Mayor's Management Report for the Police Department,* March 20, 2024. https://council.nyc.gov/budget/wp-content/uploads/sites/54/2024/03/056-NYPD.pdf at 7 ("Police Officers account for 21,543 or nearly 64 percent of the uniform headcount and have an average salary just under $85,000."). As the Comptroller noted, the NYPD recently shifted to a 12-hour shift model. Comptroller Report at 1, n.1. The Comptroller's estimate of shift hours lost means that a minimum of 2.5 officers full-time hours each month are used up by responding to unconfirmed alerts. If we merely multiply average salary, ignoring the added cost of benefits, against 2.5 officers, this bottom-end estimate of cost reaches more than $200,000. This estimate also assumes that only a single officer responds to an alert; the number would double if we assumed two officers are assigned to ride together throughout a shift and would balloon even further if more than one unit responded to an alert.

[28] See *supra* note 12.

[29] Dhruv Mehrotra and Joey Scott, *Here Are the Secret Locations of ShotSpotter Gunfire* Sensors, Wired, Feb. 22. 2024 https://www.wired.com/story/shotspotter-secret-sensor-locations-leak/

[30] *Dynamics of Racial/Hispanic Composition in NYC Neighborhoods: 2010 to 2020*, *Racial/Hispanic Composition, 2020*, POPULATION DIV., N.Y.C. DEP'T OF CITY PLANNING (Nov. 10, 2021), https://storymaps.arcgis.com/stories/46a91a58447d4024afd00771eec1dd23.

[31] COMPTROLLER REPORT app. 2, at 29–31.

[32] POPULATION DIV., N.Y.C. DEP'T OF CITY PLANNING, *supra* note 28.

[33] COMPTROLLER REPORT, *supra* note 29.

[34] *ShotSpotter Is Deployed Overwhelmingly in Black and Latinx Neighborhoods in Chicago.*, MACARTHUR JUSTICE CTR., https://endpolicesurveillance.com/burden-on-communities-of-color/ (last visited Sept. 17, 2024).

[35] *Ibid.*

[36] *See* Zoe Kolenovsky & Jazper Lu, *Durham City Council Votes to End Controversial ShotSpotter Program*, CHRONICLE (Mar. 4, 2024, 11:39 PM), https://www.dukechronicle.com/article/2024/03/duke-university-durham-city-council-nc-votes-end-controversial-shotspotter-program-gunshot-detection-software; Diba Mohtasham, *Chicago Will Drop Controversial ShotSpotter Gunfire Detection System*, N.P.R. (Feb. 15, 2024, 10:42 AM), https://www.npr.org/2024/02/15/1231394334/shotspotter-gunfire-detection-chicago-mayor-dropping; Cleve R. Wootson Jr., *Charlotte Ends Contract with ShotSpotter Gunshot Detection System*, CHARLOTTE OBSERVER (Feb. 10, 2016, 8:46 PM), https://www.charlotteobserver.com/news/local/crime/article59685506.html; *see also The Chicago Police Department's Use of ShotSpotter Technology,* CITY OF CHICAGO OFFICE OF INSPECTOR GENERAL, at 3, 15, 22. https://igchicago.org/wp-content/uploads/2023/08/Chicago-Police-Departments-Use-of-ShotSpotter-Technology.pdf

[37] John Keefe, *Sharing NYC Police Precinct Data*, https://johnkeefe.net/nyc-police-precinct-and-census-data (last updated Feb. 2022).