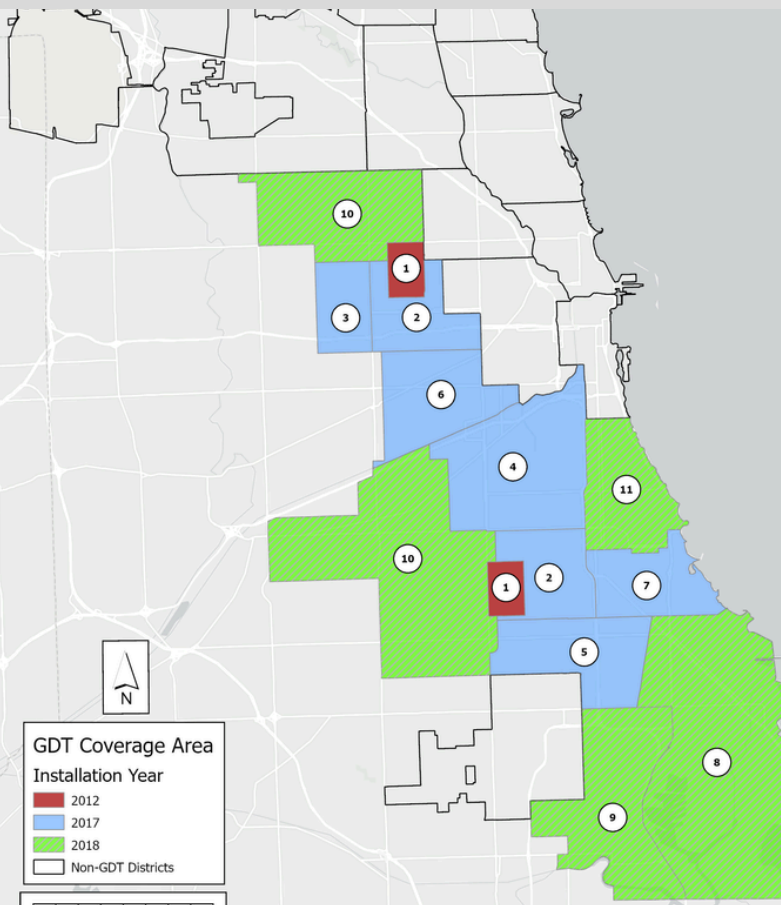


STAGGERED DEPLOYMENT OF GUNSHOT DETECTION TECHNOLOGY IN CHICAGO, IL: A MATCHED QUASI-EXPERIMENT OF GUN VIOLENCE OUTCOMES

Journal of Experimental Criminology (2023)

<https://doi.org/10.1007/s11292-024-09617-w>

*This study was funded by the National Institute of Justice (grant # 2019-R2-CX-0004)



Authors:

Nathan T. Connealy

Department of Criminology & Criminal Justice
University of Tampa

Eric L. Piza

School of Criminology & Criminal Justice
Northeastern University

Rachael A. Arietti

John Jay College of Criminal Justice
City University of New York Graduate Center

George O. Mohler

Computer Science Department
Boston College

Jeremy G. Carter

O'Neill School of Public & Environmental Affairs
Indiana University—Indianapolis

Key Takeaways:

- Chicago's Gunshot Detection Technology (GDT) coverage area expanded from approximately 3 square-miles to over 136 square-miles between 2012 and 2018
- A staggered synthetic control design was used to test the effect of GDT on gun violence occurrence across the aggregate, initial, expanded, and phase-specific deployment periods
- Gun recoveries significantly increased in GDT coverage areas in the aggregate, initial, and expanded models and in several phase-specific models relative to controls
- Shots fired calls for service increased in GDT coverage areas in the aggregate model
- GDT had no effect on fatal shootings, non-fatal shootings, general part I gun crime, or shots fired calls for service in any models

Staggered deployment of gunshot detection technology in Chicago, IL: A matched quasi-experiment of gun violence outcomes

Research Summary:

Gunshot detection technology (GDT) functions through a network of acoustic sensors that detect sounds from firearm muzzle blasts that can be audibly distinguished from other loud noises. GDT provides a way for law enforcement to respond to shots fired events without relying on citizen calls for service, which may be plagued by inconsistencies such as inaccurate information or failure to report.

The current study examines potential GDT effects in Chicago, IL. Chicago Police Department (CPD) first deployed GDT in a pilot phase in September 2012, covering an approximately 3-square mile area. In 2017, CPD began extending GDT coverage across the city through ten additional deployment phases (11 total), which brought the coverage area to over 136 square-miles. The cost of Chicago's current GDT coverage area is between \$8.8 and \$12.3 M annually based upon on the advertised annual subscription cost of between \$65 and \$90 K per square mile for the ShotSpotter system.

Chicago Mayor Brandon Johnson partially campaigned on a promise to terminate the City's ShotSpotter contract, citing concerns the system was unreliable, overly susceptible to human error, and played a pivotal role in the police killing of 13-year-old Adam Toledo. Johnson delivered on his promise on February 13, 2024, by announcing his decision to discontinue the use of ShotSpotter, with a phasing out of the technology set to begin September 2024.

The current analysis measures changes in gun violence outcomes using a matched quasi-experimental design. The approach ensures that GDT target areas are effectively matched to approximately equivalent control areas for comparison through empirical covariates in a matching algorithm. The unique GDT deployment phases in Chicago were then evaluated for aggregate, initial and expanded, and phase-specific treatment effects using difference-in-difference analyses.

The results demonstrate that GDT did not significantly impact fatal shootings, nonfatal shootings, or part I gun crimes. This result was observed across aggregate average treatment effects conditioned dynamically over time, initial effects of GDT deployment in phase one, expanded effects of GDT deployment in phases 2–11, and in most individual phase-specific effects.

GDT led to a statistically significant increase in shots fired calls for service in the aggregate model. GDT targeted police districts experienced approximately 2,050 additional shots fired CFS in total across the post-treatment period, which is a 22.12% increase relative to control units.

GDT did lead to increased levels of gun recoveries, with results indicating GDT targeted police districts experienced about 11.17% (aggregate), 8.29% (initial), and 12.28% (expanded) more gun recoveries than control units. The phase-specific models indicate that the general pattern reflected significant gun recovery increases across phases. However, a few phases also produced insignificant or bi-directional effects. A cursory review of the non-significant phases indicates that many were later-stage deployments (phases 7, 8, 9, and 11) and may have reflected target areas with comparatively lower levels of gun violence that are less likely to be subjected to additional enforcement strategies.

The results align with prior literature that has found a procedural benefit, but not a crime prevention benefit, of gunshot detection technology.