

GUNSHOT DETECTION TECHNOLOGY EFFECT ON GUN VIOLENCE IN KANSAS CITY, MISSOURI: A MICROSYNTHETIC CONTROL EVALUATION

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Key Takeaways:

- Gunshot detection technology (GDT) was associated with ~30% higher levels of ballistic evidence collection in the GDT target area and surrounding catchment area
- GDT was associated with ~30% higher levels of gun recoveries in the surrounding catchment area
- GDT was associated with ~22% lower levels of shots fired calls for service in the GDT target area
- GDT did not influence any of the gun violence categories involving confirmed victims (non-fatal shootings, fatal-shootings, and aggravated assaults/robberies committed with a firearm)
- Agencies that prioritize gun violence reduction—rather than reducing calls for shots fired or increasing ballistic evidence collection—should consider if resources are better used for solutions other than GDT

Gunshot Detection Technology Effect on Gun Violence in Kansas City, Missouri: A Microsynthetic Control Evaluation

Research Summary:

Gunshot detection technology (GDT) has recently emerged as a core entry into the suite of technological gun violence prevention solutions incorporated by police. Despite increased popularity of the technology, the research evidence on GDT is underdeveloped, especially as compared to other police technologies. While certain GDT studies have taken efforts to select control areas with similar crime and sociodemographic conditions as the target areas, this is not commonplace in GDT research. Furthermore, such research has used a fuzzy matching approach where control areas are selected based on their general similarity with target areas rather than through quantitative matching techniques that ensure statistical equivalency between treatment and control areas.

The current study aims to contribute to the knowledge on GDT effect on crime occurrence through a rigorous evaluation of the technology in Kansas City, MO. The Kansas City Police Department installed SoundThinking's ShotSpotter GDT system in September 2012, with the target area covering approximately 3.5 square miles of the city. Kansas City pays between \$227,500 and \$315,000 per year for their ShotSpotter system based on the advertised annual subscription cost of between \$65K and \$90K per square mile. The system detected 11,517 gunfire events through the end of 2019, the final year of our study period.

We apply the recently developed microsynthetic control method in the evaluation, incorporating over 13 years of data. The microsynthetic control method modifies the synthetic control method for application to micro-geographic units of analysis. The control group was specified to match the GDT target area across 18 covariates.

Both process and outcome measures were tested in the analysis. Process measures included gun recoveries and NIBIN ballistic evidence collection to reflect the enforcement-related causal mechanisms of GDT. Outcome measures included shots fired calls for service, non-fatal shootings, fatal shootings, and gun assaults and robberies. The statistical analysis was conducted for both the GDT target area to measure main effects and a surrounding catchment area to measure spatial displacement effects.

The collection of NIBIN ballistic evidence was significantly higher by approximately 30% compared to the weighted control area in both the GDT target area (476 vs. 365) and catchment area (351 vs. 271). Gun recoveries were nearly 13% higher in the catchment area than the weighted control area (1,668 vs. 1,477). Shots fired calls for service were approximately 22% lower in the GDT target area than the weighted control area (5,665 vs. 7,285). Importantly, none of the three crime types involving confirmed victims (fatal shootings, non-fatal shootings, gun assaults and robbery) exhibited any significant changes following the installation of GDT in either the target area or catchment area.

Overall, the study results do not offer much empirical support for GDT as a gun violence prevention tool in Kansas City. Agencies that highly prioritize increasing evidence collection and reducing unauthorized firearm discharges may consider dedicating necessary resources to acquire GDT. Agencies that prioritize the reduction of gun violence victimization, however, should consider whether resources are better used for solutions other than GDT.