THE EFFECT OF GUNSHOT DETECTION TECHNOLOGY ON EVIDENCE COLLECTION AND CASE CLEARANCE IN KANSAS CITY, MISSOURI

Journal of Experimental Criminology (2023)
https://doi.org/10.1007/s11292-023-09594-6

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

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Key Takeaways:

- This study tests whether (1) shots fired calls for service in the gunshot detection technology (GDT) target area are more likely to be classified as unfounded; (2) police responses to shootings in the GDT target area are more likely to recover ballistic evidence or firearms; and (3) shootings in the GDT target area are more likely to be cleared
- Shots fired calls for service in the GDT target area were 15% more likely to be unfounded
- For fatal shootings, GDT treatment was not associated with increased likelihood of ballistic evidence collection or case clearance
- For non-fatal shootings, GDT treatment was not associated with increased likelihood of ballistic evidence collection, gun recovery, or case clearance
- GDT may not add value to investigations and may increase patrol workload

The effect of gunshot detection technology on evidence collection and case clearance in Kansas City, Missouri

Research Summary:

Clearance rates have long been used as a measure of police performance and effectiveness, reflecting the importance of incapacitation in disrupting patterns of violence and creating a general deterrence effect, and the public desire to deliver justice to crime victims and their families. Research relating to the level to which technology improves case clearance are highly mixed, with technology improving investigative function in certain cases but not others.

Gunshot detection technology (GDT) has become a central component of police efforts to respond to and investigate gun violence. Over 250 public safety agencies worldwide have adopted the ShotSpotter platform developed by SoundThinking, the global industry leader in GDT. The majority of evaluation studies have explored GDT's crime prevention capacity, despite the technology arguably offering more potential for investigative police functions. The few studies that have focused on GDT's impact on investigative outcomes, such as evidence collection and case clearance, have generated little consensus.

The current study evaluates GDT's effect on evidence collection and case clearance in Kansas City, MO. The Kansas City Police Department (KCPD) 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 used the entropy balancing method to conduct a matched case–control evaluation. Entropy balancing is a quasi-experimental design that matches treatment and control units by reweighting covariates based on propensity for treatment. The sum of the control unit weights equals the total number of cases in the treated group. Eighteen covariates were used in the entropy matching algorithm to create a weighted control group that mirrors the treatment group across relevant measures. The influence of GDT was tested through logistic regression models incorporating the weights from the entropy matching procedure. The entropy weights were incorporated as probability weights in the logistic regression models.

Results indicate that shots fired calls for service in the GDT target area have a 15% increased likelihood of being unfounded as compared to the control group. Fatal shooting incidents in the GDT target area were no more likely to result in collection of ballistic evidence for NIBIN analysis, or subsequent case clearance, as compared to incidents in the control area. Non-fatal shooting incidents in the GDT target area were no more likely to result in collection of ballistic evidence for NIBIN analysis, the recovery of firearms, or subsequent case clearance, as compared to incidents in the control area.

The current study did not find support for GDT as an investigatory tool for either fatal or non-fatal shooting incidents. The increased likelihood of unfounded shots fired cases has important implications for GDT use by police. This reflects increased workload of police responding to incidents where gunfire was not confirmed.