

Strategies for Policing Innovation



Strategies for Policing Innovation Spotlight Report

Boston, Massachusetts, Strategies for Policing Innovation II

Improving Homicide Clearance Rates: The Value of Analysis to Guide Investments in Investigative Policies and Practices

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Strategies for Policing Innovation: Research Snapshot

Since the mid-2000s, homicide clearance rates in Boston have been substantially lower than national homicide clearance rates. Between 2004 and 2011, about 44 percent of homicides investigated by the Boston Police Department (BPD) homicide unit were cleared, compared with some 63 percent of homicides investigated by U.S. law enforcement agencies nationwide. With the support of U.S. Bureau of Justice Assistance (BJA) Strategies for Policing Innovation¹ (SPI) funds, BPD engaged in a problem-oriented policing enterprise to understand the underlying nature of its homicide clearance problem, develop appropriate responses to enhance its investigations of homicide victimizations, and evaluate the impact of the implemented intervention. The problem analysis included an investigation of 314 homicide victimizations from 2007 to 2011, as well as the creation of a homicide advisory committee that identified gaps in its investigative processes and suggested best practices, drawing especially on the United Kingdom model.

Using the results from the problem analysis, in January 2012, the Boston SPI team implemented a multipronged response (Boston SPI II) to improve BPD homicide clearances, including expanding homicide unit staff by more than one-third (35.7 percent), providing extensive additional training in cutting-edge investigative and forensic science techniques, developing and implementing standardized investigative protocols citywide, and holding monthly peer review sessions to discuss all open homicide investigations.

The Boston SPI team conducted a comprehensive evaluation of the homicide clearance intervention. Results yielded several positive findings, including the following:

- In every measured category, BPD increased resources dedicated and investigative activities undertaken (some but not all improvements were statistically significant).
- The homicide clearance rate rose by 10–18 percent (unadjusted and adjusted, respectively, depending on inclusion of cases awaiting grand jury decision). This increase was statistically significant.
- The improvement in Boston's homicide clearance was not observed in the rest of Massachusetts or nationally.
- Advanced statistical analysis showed that the intervention was associated with statistically significant increases in the probability of clearance.

The Boston SPI II offers several important lessons for law enforcement agencies seeking to improve their homicide clearance rates. The Boston intervention demonstrates the value of enhancing investigative resources and of adopting a comprehensive resource mindset rather than focusing on one particular resource. The Boston SPI II also demonstrates the effectiveness of the problem-oriented policing approach for analyzing and identifying problems with homicide investigative processes, developing responses to those problems, and assessing the impact of the responses.

¹At the time of award in 2011, this project was titled the Smart Policing Initiative.

THE BOSTON, MASSACHUSETTS, STRATEGIES FOR POLICING INNOVATION II: IMPROVING HOMICIDE CLEARANCE RATES: THE VALUE OF ANALYSIS TO GUIDE INVESTMENTS IN INVESTIGATIVE POLICIES AND PRACTICES¹

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INTRODUCTION

Clearance is viewed by many as a critical measure of police performance, embodying the goals of holding offenders accountable and effectively preventing crime.² Police researchers have long debated the extent to which police can boost clearance rates through additional resources, technology, and investigative effort. The landmark Rand Corporation study, which observed detective operations in 25 police agencies and surveyed detective practices in an

additional 156 police departments,³ found that:

- The most serious crimes are solved by the responding patrol officer through information obtained from the victim(s) rather than through leads developed by investigators.
- In more than half of cases solved, the suspect's identity is known or easily determined at the time the crime is reported to police.
- An investigator's time is consumed largely in reviewing reports, documenting files, and attempting to locate and interview victims on cases that experience has shown are unlikely to be solved.
- Many investigations are conducted without any hope of developing leads, simply to satisfy victims' expectations.⁴

Many crime policy experts continue to be skeptical of the potential of enhanced follow-up criminal investigations to bring

¹ At the time of award in 2011, this project was titled the Boston Smart Policing Initiative II. For a complete review of this project, see A. A. Braga and D. Dusseault, *Can Homicide Detectives Improve Homicide Clearance Rates? Final Report* (Boston: Northeastern University and Boston Police Department, 2016).

² According to the FBI, an offense is "cleared by arrest" or solved for crime reporting purposes when at least one person is arrested, charged with the commission of the offense, and turned over to the court for prosecution. An offense is also counted as cleared by arrest if certain "exceptional" conditions pertain, including suicide of the offender, double murder, deathbed confession, offender killed by police or citizen, confession by offender already in custody, denial of extradition, refusal of victim to cooperate in prosecution, death of offender by natural causes or by accident or in the commission of another offense, or handling of a juvenile offender orally or by written notice to parents in instances involving minor offenses where no referral to juvenile court is customarily made. Visit: <https://ucr.fbi.gov/crime-in-the-u.s/2014/crime-in-the-u.s.-2014/offenses-known-to-law-enforcement/clearances/main> (accessed July 31, 2016).

³ P. Greenwood and J. Petersilia, *The Criminal Investigation Process—Volume I: Summary and Policy Implications* (Santa Monica, CA: Rand Corporation, 1975).

⁴ P. Greenwood, J. Chaiken, and J. Petersilia, *The Investigation Process* (Lexington, MA: Lexington Books, 1977).

perpetrators of crime to justice.⁵ In his assessment of enhanced post-crime investigation practices, Eck concluded, “It is unlikely that improvements in the way investigations are conducted or managed have a dramatic effect on crime or criminal justice.”⁶ Recent research has supported Eck’s conclusions. In a longitudinal analysis of 570 law enforcement agencies from 2000 to 2012, Worrall found that investigative resources play only a marginal role in determining violent and property crime clearance trajectories over time.⁷

Others, however, suggest that the capacity of homicide detectives to solve homicides could be improved by dedicating adequate resources and training, and by adopting better investigative practices and procedures.⁸ Positive developments in investigative practices include more effective and just ways of interviewing victims, witnesses, and suspects; proper methods of conducting perpetrator line-ups; and better handling of physical evidence.

Newly available forensic technology has vastly improved investigators’ ability to make links between crimes and offenders. For instance, a National Institute of Justice-sponsored experiment using DNA to solve property crime found that collecting and analyzing physical evidence at crime scenes increase investigators’ capacity to identify, arrest, and prosecute criminal offenders.⁹

However, although improved investigative techniques and technology have arguably increased the likelihood that the “right” people are being arrested for crimes, these advances do not seem to translate into a higher probability of arrest for offenders. Clearance rates for violent and property crimes in the United States have remained relatively stable over the last 40 years.¹⁰

⁵ D. Bayley, *Police for the Future* (New York: Oxford University Press, 1994); C. Lum and D. Nagin, “Reinventing American Policing: A Seven-Point Blueprint for the 21st Century,” *Crime and Justice* (vol. 45), ed. M. Tonry (Chicago: University of Chicago Press, 2016).

⁶ J. E. Eck, “Criminal Investigation,” *What Works in Policing? Operations and Administration Examined*, ed. G. Cordner and D. Hale (Cincinnati, OH: Anderson, 1992), 33.

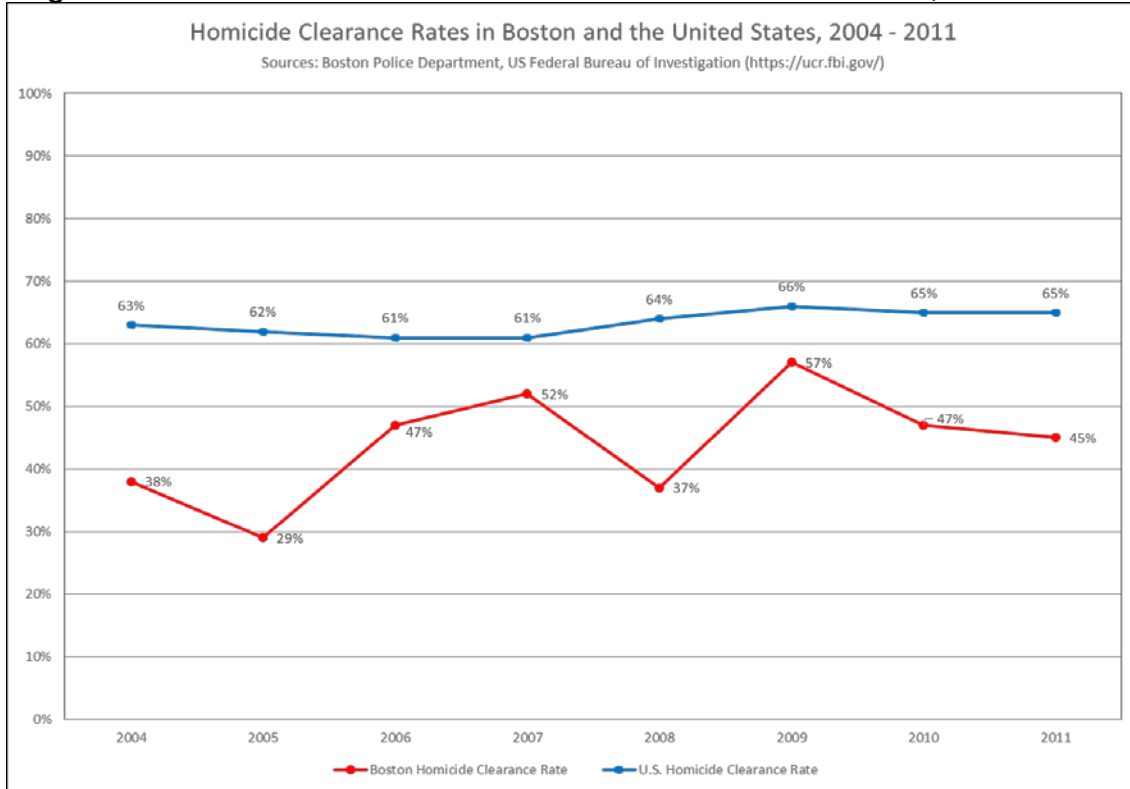
⁷ J. L. Worrall, “Investigative Resources and Crime Clearances: A Group-Based Trajectory Approach,” *Criminal Justice Policy Review* (May 2016). DOI: 10.1177/0887403416650251.

⁸ C. Wellford and J. Cronin, *An Analysis of Variables Affecting the Clearance of Homicides: A Multistate Study* (Washington, DC: Justice Research and Statistics Association, 1999).

⁹ N. Ritter, “DNA Solves Property Crimes (But Are We Ready For That?),” *NIJ Journal* 261 (2008): 2–12. But see also D. Schroeder and M. D. White, “Exploring the Use of DNA Evidence in Homicide Investigations: Implications for Detective Work and Case Clearance,” *Police Quarterly* 12, no. 3 (2009): 319–342.

¹⁰ According to the FBI, the probability of arrest for violent crimes and property crimes has hovered around 46 percent and 17 percent, respectively, between 1971 and 2007. A. A. Braga, E. Flynn, G. Kelling, and C. Cole, *Moving the Work of Criminal Investigators Toward Crime Control* (Washington, DC: U.S. National Institute of Justice, 2011). In 2014, the most recent full year of data available, law enforcement agencies cleared 47.4 percent of violent crimes and 20.2 percent of property crimes. Visit: <https://ucr.fbi.gov/crime-in-the-u.s/2014/crime-in-the-u.s.-2014/offenses-known-to-law-enforcement/clearances/main> (accessed July 31, 2016).

Figure 1. Homicide Clearance Rates in Boston and the United States, 2004–2011



I. THE BOSTON STRATEGIES FOR POLICING INNOVATION II

Since the mid-2000s, homicide clearance rates in Boston have been substantially lower than national homicide clearance rates (figure 1). Between 2004 and 2011, about 44 percent of the homicides investigated by the BPD homicide unit were cleared, compared with some 63 percent of homicides investigated by U.S. law enforcement agencies.¹¹ In 2011, former BPD Commissioner Edward Davis made a commitment to address the problem of persistently low homicide

clearance rates. With the support of U.S. Bureau of Justice Assistance (BJA) Strategies for Policing Innovation (SPI) funds, BPD engaged in a problem-oriented policing enterprise to understand the underlying nature of its homicide clearance problem, develop appropriate responses to enhance its investigations of homicide victimizations, and evaluate the impact of the implemented intervention.¹² The BPD homicide clearance project was led by sworn and civilian staff from the Bureau of Investigative Services (BIS),

¹¹ Visit: <https://ucr.fbi.gov/crime-in-the-u.s/> (accessed July 31, 2016).

¹² H. Goldstein, *Problem-Oriented Policing* (Philadelphia: Temple University Press, 1990); A. A. Braga, *Problem-Oriented Policing and Crime Prevention*, 2nd ed. (Monsey, NY: Criminal Justice Press, 2008).

Office of Research and Development (ORD), and the Office of the Police Commissioner (OPC).

II. PROBLEM ANALYSIS

The problem analysis involved quantitative and qualitative examinations of current BPD homicide investigation policies and practices. BPD engaged researchers from Northeastern University to assist in the completion of a high quality statistical analysis of 314 homicide victimizations between January 1, 2007, and December 31, 2011. Drawing on homicide case file information and interviews with homicide detectives, this analysis examined the influence of homicide case characteristics (such as circumstances, weapon used, witnesses, suspect-victim relationship) and BPD investigative practices (such as response time, actions of first responders securing the scene, evidence collected, number of detectives, computer checks, DNA and ballistic testing) on the likelihood that homicide cases were cleared.¹³ BPD also convened a homicide advisory committee staffed by homicide detectives, district detectives, Crime Scene Response Unit (CSRU) officers, forensic group analysts, intelligence analysts, homicide prosecutors, and others to identify best practices and gaps in their investigative processes. BPD also contacted seven U.S. police departments with high 2010

¹³ The statistical analysis confirmed that Boston homicide clearances were influenced by case characteristics, community context, investigative practices, available resources, and other factors. For brevity, these results are not presented here.

homicide clearance rates (Denver, Fort Worth, Houston, Milwaukee, Philadelphia, San Diego, and Tulsa) and interviewed representatives from their homicide units on their investigative policies and practices. The development of the homicide clearance intervention then drew upon best practices in other jurisdictions, most notably from the United Kingdom (UK).¹⁴ BPD hired a UK investigative consultant to review and make recommendations on the proposed reforms to its homicide investigation policies and practices.

II. THE RESPONSE

Using the results of the problem analysis, the Boston SPI team implemented a multifaceted intervention designed to improve homicide clearances that included expanding the homicide unit, enhancing the training of detectives, adopting standardized practices and policies, and instituting monthly peer reviews of homicide investigations.

Expansion of the Homicide Unit

The BPD homicide clearance intervention implementation started in January 2012 with the expansion of the homicide unit. The BPD homicide unit, commanded by a

¹⁴ Since the 1990s, UK police forces have made a concerted effort to improve their homicide investigations by developing strong investigative accountability structures, enhancing investigator training, and professionalizing the investigative process. M. Innes, *Investigative Murder Detective Work and the Police Response to Criminal Homicide* (Oxford, UK: Oxford University Press, 2003); B. Loveday and A. Marlow, eds., *After MacPherson: Policing After the Stephen Lawrence Inquiry* (Dorset, UK: Russell House Publishing, 2005).

lieutenant detective, comprises eight squads handling current investigations and one cold case squad investigating older unsolved homicides. Under the intervention, each homicide squad, previously staffed by one sergeant detective and two detectives, was assigned an additional detective. A civilian crime analyst was also hired to enhance the unit's ability to search computerized databases in real time and pursue analyses to generate investigative leads. Thus, BPD homicide unit investigative personnel expanded by slightly more than one-third (35.7 percent, from 28 to 38). BPD also added a second victim-witness resource officer and strengthened its connections to victim assistance organizations to improve relationships between detectives and homicide victims' families and witnesses.¹⁵

Training

The homicide unit, CSRU, and forensic group staff received extensive additional training in cutting-edge investigative techniques over the course of the intervention implementation. This training included an updated and improved annual 40-hour crime scene

response and investigation in-service training at the BPD Academy for the homicide unit and district detectives, medico-legal homicide investigation training offered by the forensics program at Boston University Medical Center for homicide unit detectives, homicide unit detective attendance at the New York State Homicide Seminar, and updated and expanded annual in-service training for forensic group and CSRU staff. BPD also sent two BIS deputy superintendents to the UK National Policing Improvement Agency's senior investigative officer training, which detailed its investigative business model and covered important concepts such as peer review of homicide investigations.

Standardized Investigative Protocols

The problem analysis phase uncovered substantial variation in homicide investigation practices across individuals, police districts, and units investigating Boston homicide cases. A key element of the homicide clearance intervention therefore involved developing and implementing a comprehensive set of standardized protocols to guide work activities across the different stages of homicide investigations. These protocols included designating a crime scene entry log scribe and a canvas supervisor, formalizing witness identification and management techniques, assigning responding district detectives to homicide unit detectives for on-scene and post-scene briefing, increasing the deployment of forensic group technicians to homicide

¹⁵ The victim-witness service component of the BPD homicide unit advocates for family members of the victim during the stages of grief and recovery. The purpose of victim-witness resource officers is to maintain positive communication between detectives and these survivors through meetings, forums, initiatives, and other community events. Advocates work with officers to help grieving families by connecting families to funeral and burial resources and making referrals to public and nonprofit counseling and trauma services. Witnesses are also provided with resources and, as appropriate, considered for relocation services.

scenes, collecting and transferring evidence to the forensic group for storage and testing, and working with homicide prosecutors to prepare cases for consideration by grand juries. The protocols provided guidance for supervisors and line staff working in each investigative area and required participants to fill out checklist forms. These documents were reviewed by BIS command staff to ensure standardization was achieved.

Peer Review of Homicide Cases

The BPD homicide unit began convening monthly peer review sessions for all open homicide investigations. The goal of the peer review sessions was to increase accountability by ensuring that all possible avenues for identifying responsible offenders were being pursued. Investigating detectives presented key aspects of cases to their peers and supervisors. The BIS superintendent, homicide unit commander, and other homicide detectives not assigned to the cases would offer constructive criticism and advice to investigating detectives. A similar process was put in place to manage the processing and testing of physical evidence by forensic group technicians. Over the course of the intervention period, BPD also acquired and used new forensic technology such as 3D shooting incident reconstruction technology to more accurately identify bullet trajectory flight paths at homicide scenes.

III. ASSESSMENT

Data

This evaluation used BPD incident data collected on 465 homicide victimizations occurring in Boston between January 1, 2007, and December 31, 2014. The BPD homicide incident data were supplemented by a careful review of investigative case files and in-depth interviews with homicide detectives who handled each investigation. Drawing on these quantitative and qualitative data, researchers coded key aspects of each homicide investigation from the initial call for service to the decision to arrest the suspect(s) or submit the case to the grand jury. Detailed information on the circumstances of each homicide and on known victim-offender relationships was collected and coded.¹⁶

Massachusetts is the only U.S. state with a law that places the decision to charge a suspect with a homicide in the hands of the local prosecutor. Since conviction rates rather than clearance rates are key performance metrics for prosecutors, this legal requirement makes it more difficult to clear homicide cases in Massachusetts. Prosecutors in the Suffolk County District Attorney's Office (SCDA) decide whether to recommend a case to the grand jury to determine whether to indict the suspect(s)

¹⁶ To ensure coder reliability, three trained research assistants separately coded the quantitative and qualitative data collected for 100 randomly selected homicide victims (21.5 percent of 465). Subsequent analysis revealed no significant differences in homicide circumstances or reported investigative activities among the three coders.

to be prosecuted for Boston homicides. After suspects are indicted by grand juries, arrest warrants are issued and these cases are then considered cleared by the BPD homicide unit. SCDA prosecutors use the grand jury exclusively to avoid unintended miscarriages of justice and to ensure that forwarded cases are strong enough to maximize the probability of conviction during a full jury trial. In practice, however, all cases recommended to the grand jury result in the indictment of suspects.¹⁷

The key outcome variable used in this evaluation was binary: homicides were either cleared (1) or not cleared (0) as of March 1, 2016. As of March 1, 2016, 2 cases before the start of the intervention and 14 cases after the start of the intervention awaited grand jury decisions. Clearly, excluding grand jury cases after the start of the intervention would bias the analysis against detecting a program impact, as most pretest cases had the benefit of being considered by the grand jury. Therefore, we also developed an “adjusted clearance rate” binary outcome variable that included homicide cases that were awaiting grand jury consideration as another measure of program impacts. Our within-Boston, pre-post statistical analyses examined both binary outcome variables as possible lower and upper

bounds of any discernible intervention impacts on homicide clearances.

We also obtained homicide clearance data reported by all other Massachusetts police departments from the Massachusetts Executive Office of Public Safety and Security. Other Massachusetts jurisdictions experienced 814 total homicide victimizations between January 1, 2007, and December 31, 2014. These data serve as a baseline for comparing any observable changes in Boston homicide clearance rates with existing homicide clearance rate trends in other Massachusetts jurisdictions.

Analysis

Our evaluation began with simple pre-post comparisons of key characteristics of BPD homicide investigations to determine whether the intervention changed investigative practices. When associating impact evaluation findings with observed results, it is critical to determine whether the intervention was implemented with integrity and accountability.¹⁸ Differences of proportions *z*-score comparisons and differences of mean *t*-tests¹⁹ were used to evaluate whether BPD homicide investigation activities changed between the pre-intervention and intervention periods. We then used a differences of proportions *z*-score comparison to determine whether the intervention changed within-Boston homicide

¹⁷ Lieutenant Detective Darrin Greeley, the current commander of the BPD homicide unit, stated that all of the cases that were brought before the grand jury during the study period resulted in indictments. He credited the careful work of homicide investigators in ensuring they had strong cases against suspected offenders and the conservative decision-making of SCDA prosecutors who cared primarily about conviction rates rather than clearance rates.

¹⁸ P. Rossi, M. Lipsey, and H. Freeman, *Evaluation: A Systematic Approach*, 7th ed. (Thousand Oaks, CA: Sage Publications, 2004).

¹⁹ H. M. Blalock, *Social Statistics*, 2nd ed. (New York: McGraw-Hill, 1979).

clearance rates over the course of the study period. Finally, in our quasi-experimental assessment, we used differences-in-differences estimators to determine whether any observed changes in the within-Boston clearance rates between the pre-intervention and intervention periods were distinct from observed changes in clearance rates for other U.S. and Massachusetts jurisdictions over the same time periods. Hierarchical linear models—specifically, mixed effects logistic regression models—were used in our deeper assessment of the impact of the BPD homicide clearance intervention on whether Boston homicide cases were cleared.²⁰

IV. RESULTS

Changes in Dedicated Resources and Selected Investigative Activities

The BPD intervention increased the overall resources dedicated and investigative activities undertaken by the BPD homicide unit to clear cases (table 1 on page 9). Every measured category showed improvements, many of which were statistically significant. For instance, the number of homicide detectives investigating each homicide rose significantly ($p < .01$) during the intervention period. The number of

witnesses interviewed also showed a statistically significant increase ($p < .05$).

The handling of homicide crime scenes showed several important statistically significant improvements. The homicide crime scenes worked during the intervention period more frequently had a homicide supervisor present ($p < .05$) and additional CSRU officers collecting evidence at the scene ($p < .01$). They also were more likely to have forensic group specialists deployed ($p < .05$) to enhance the collection of specific kinds of evidence (crime lab DNA, latent prints, and ballistic technicians). The BPD intervention also generated statistically significant improvements in post-scene investigative activities. The amount of evidence analyzed by the crime lab increased during the intervention period ($p < .01$); this improvement included increases in the proportions of homicide cases that had at least one piece of evidence submitted for DNA testing ($p < .01$) and for trace, pattern, and other analyses (less restrictive $p < .10$ significance level).

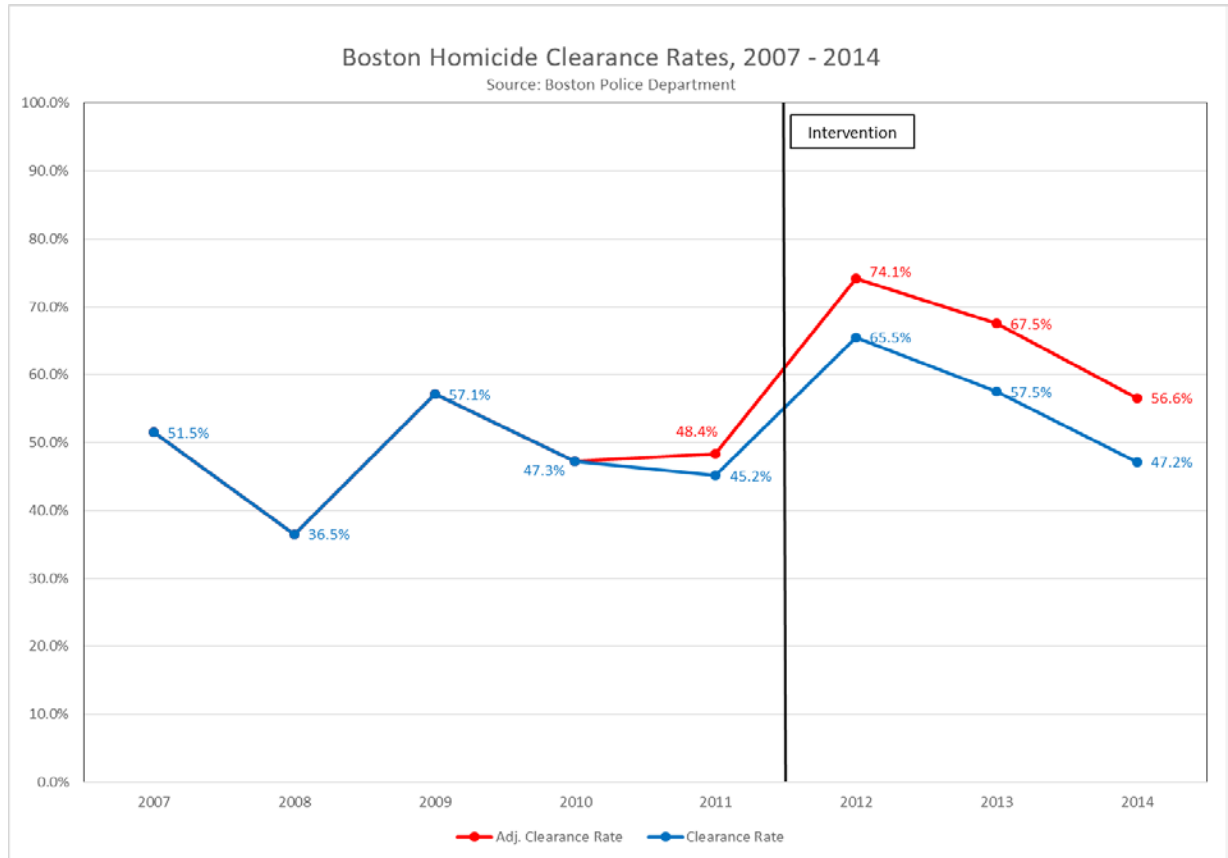
²⁰ For a full discussion of the statistical modeling techniques, see A. A. Braga and D. Dusseault, *Can Homicide Detectives Improve Homicide Clearance Rates? Final Report* (Boston: Northeastern University and Boston Police Department, 2016).

Table 1. Comparison of Resources and Activities in Boston Homicide Investigations

	<u>Pre-Intervention</u>	<u>Intervention</u>	
N	314	151	
	<i>Mean (Standard Deviation)</i>	<i>Mean (Standard Deviation)</i>	<i>t-test result</i>
Response time (minutes)	21.3 (15.8)	20.1 (15.6)	-0.77
Homicide detectives	3.6 (1.2)	4.5 (1.1)	7.77**
District detectives	4.2 (2.2)	4.5 (1.9)	1.43
CSRU officers at scene	2.4 (0.5)	3.0 (0.7)	10.58**
CSRU time at scene (minutes)	151.2 (83.1)	158.5 (79.8)	0.91
Officers canvassing for witnesses	7.5 (4.6)	7.6 (3.4)	0.24
Witnesses interviewed from scene	8.9 (6.8)	9.6 (8.1)	0.98
Witnesses interviewed after scene	3.5 (3.7)	4.6 (5.5)	2.54*
Evidence collected	25.5 (21.9)	29.0 (19.3)	1.68+
Evidence analyzed by crime lab	2.5 (5.6)	5.1 (8.5)	3.93**
Evidence analyzed by latent print unit	7.3 (14.9)	7.5 (16.0)	0.13
Evidence analyzed by ballistics unit	7.7 (12.3)	8.3 (10.8)	0.51
	<i>Percent</i>	<i>Percent</i>	<i>z-score result</i>
Homicide supervisor at scene	91.4	96.7	2.11*
Outside LE agency involvement	43.6	49.0	1.09
At least one search warrant executed	59.9	70.9	2.31*
Other officers provided information	48.7	55.0	1.27
Forensics group units at scene	23.9	32.5	1.96*
Video evidence collected	48.7	52.3	0.73
Computer check – victim	97.5	98.0	0.33
Computer check – suspect(s)	95.2	96.0	0.39
Computer check – witnesses	93.3	97.4	1.83+
Computer check – vehicle(s)	73.5	74.8	0.30
Computer check – scene	70.2	79.3	2.07*
DNA testing	28.6	43.0	3.09**
Trace, pattern, other analyses	29.9	36.4	1.68+
Latent print testing	57.2	64.9	1.58
Ballistic testing	66.6	68.2	0.34

+ $p < .10$, * $p < .05$, ** $p < .01$

Figure 2. Boston Homicide Clearance Rates, 2007–2014



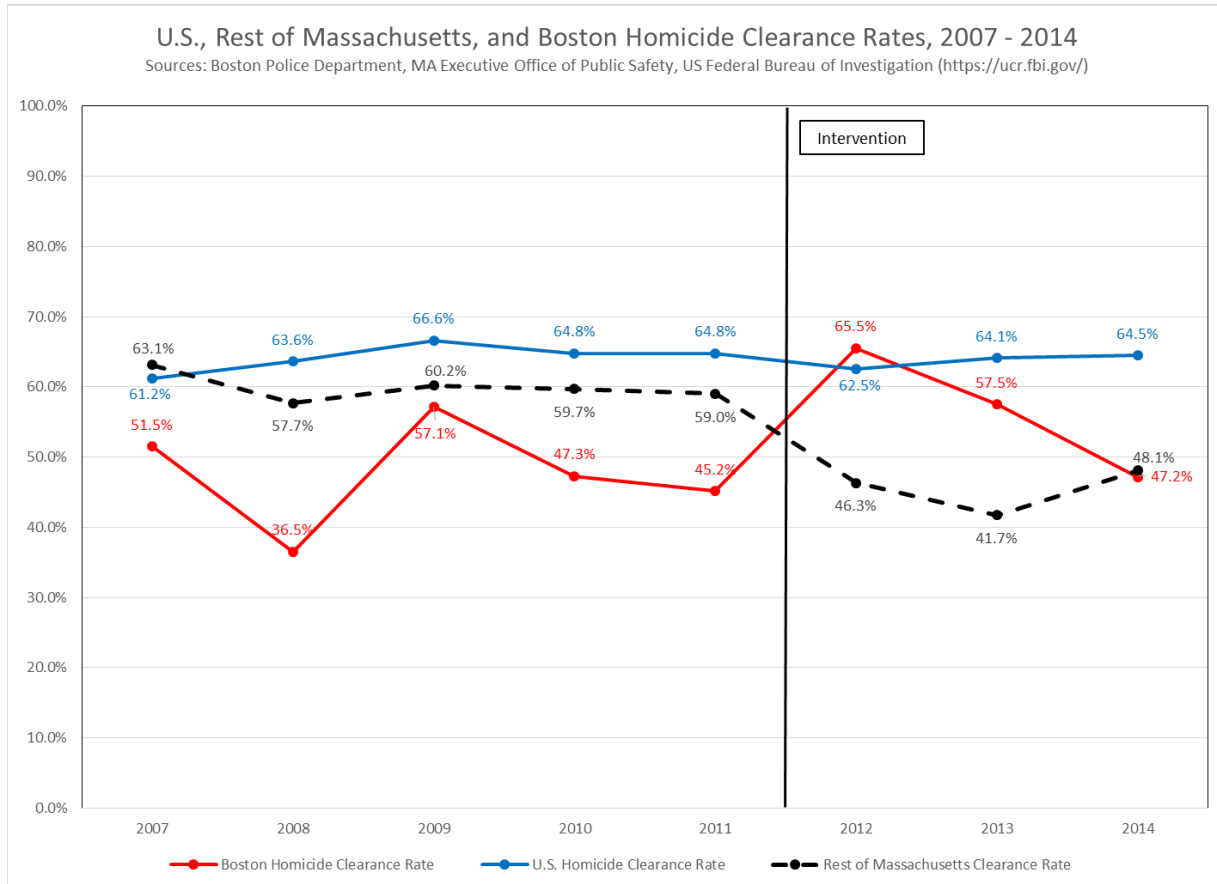
Simple Pre-Intervention and Intervention Clearance Rate Outcome Comparisons

Figure 2 presents the yearly standard and adjusted homicide clearance rates in Boston over the 8 year study time period (5 pre-intervention years, 3 intervention years). Using the standard clearance rate as a measure, the BPD homicide clearance rate rose 9.8 percent from 47.1 percent (148 of 314 homicide victims) in the pre-intervention period to 56.9 percent (86 of 151 homicide victims) in the intervention period—a statistically significant improvement ($z = 1.981$, p

= .0478). Using the adjusted clearance rate as a measure, the BPD homicide clearance rate rose 18.4 percent from 47.8 percent (150 of 314 homicide victims) in the pre-intervention period to 66.2 percent (100 of 151 homicide victims) in the intervention period—also a statistically significant improvement ($z = 3.726$, $p = .0002$).²¹

²¹ Figure 2 shows that the homicide clearance rate peaked in 2012 and then declined in 2013–14. The dip in 2013–14 represents yearly variations in case composition. Boston experienced a higher percentage of difficult-to-solve gang homicides in 2013 and 2014. The intervention did impact the clearance of gang homicides. The regression analysis presented in the next section controls for case characteristics and highlights the statistically significant improvement in clearance post-intervention.

Figure 3. U.S., Rest of Massachusetts, and Boston Homicide Clearance Rates, 2007–2014



Between the pre-intervention and intervention periods, homicide clearance rates for other Massachusetts law enforcement agencies fell by 14.9 percent from 60.0 percent (343 of 572 homicide victims) to 45.1 percent (109 of 242 homicide victims) (figure 3). The differences-in-differences comparison of clearance between Boston and the rest of Massachusetts confirmed that the +24.7 percent difference represented a statistically significant improvement ($z = 4.01, p < .0001$). Moreover, yearly U.S. homicide clearance rates fell only slightly (-0.5 percent) from 64.2 percent in the

pre-intervention period to 63.7 percent in the intervention period; however, the +10.3 percent differences-in-differences between Boston and U.S. homicide clearance rates was also statistically significant ($z = 2.21, p < .05$). These comparative analyses suggest that the observed improvement in Boston homicide clearance rates was distinct from observed changes in clearance rates for other Massachusetts jurisdictions and the United States over the same time periods.

Mixed Effects Logistic Regression Model Results.

We carried out mixed effects logistic regression models estimating the impact of the BPD homicide clearance intervention on the standard homicide clearance rate and the adjusted homicide clearance rate. Both models revealed that the BPD homicide clearance intervention increased the probability that Boston homicide cases were cleared over the course of the study period. Using the standard clearance rate, holding the other covariates constant, the BPD homicide intervention was associated with a statistically significant 43.4 percent increase ($p < .05$) in the odds that a homicide case was cleared. Using the adjusted clearance rate, homicide cases were nearly 2.3 times ($p < .01$) more likely to be cleared in the intervention period than in the pre-intervention period, while controlling for the other covariates.²²

V. LESSONS LEARNED

The Boston SPI II suggests that criminal investigators can improve their ability to hold even the most serious offenders accountable for their crimes. The BPD homicide unit raised the yearly Boston homicide clearance rate by nearly 10 percent when the standard clearance rate definition was applied and by more than 18 percent when the clearance rate definition was extended to include cases

awaiting grand jury decisions. Equally important, the upward trajectory of the Boston yearly homicide clearance rate diverged significantly from those of yearly homicide clearance rates in other Massachusetts and U.S. jurisdictions. Although the arrests of homicide offenders obviously do not offset the devastating loss of loved ones, improving the capacity of homicide detectives to clear homicide cases better enables the criminal justice system to provide much-needed closure to victims' grieving families. The Boston SPI II provides several important lessons for law enforcement agencies seeking to improve clearance rates.

Enhanced Investigative Resources Make a Difference

The Boston intervention provides some much needed, rigorous evidence that enhanced investigative resources boost homicide clearance rates. Investments made by the City of Boston (to add nine homicide detectives and one victim-witness resource officer) and through a BJA grant (to hire a civilian crime analyst, provide additional training, work with academic partners on a problem-oriented approach to refine existing practices, and purchase forensic equipment) enabled the BPD homicide unit to raise its clearance rate substantially. Such increased investments in homicide investigations improve the chances that murderers will be apprehended in even the most difficult cases to clear—gang- and drug-related gun homicides committed on the street, crimes that plague most urban areas.

²² For the full results from the regression models, see A. A. Braga and D. Dusseault, *Can Homicide Detectives Improve Homicide Clearance Rates? Final Report* (Boston: Northeastern University and Boston Police Department, 2016).

Some jurisdictions may consider such investments cost prohibitive; however, this view fails to take into account the very large societal costs of murders, including victim costs, criminal justice costs, lost offender productivity, and public willingness-to-pay costs.²³ A recent study suggested that the average cost per murder exceeded \$17.25 million and that the average murderer posed costs approaching \$24 million.²⁴ Improved homicide clearance rates could also lower murder rates by changing offender perceptions of apprehension risks or by disrupting cycles of gang- and drug-related violence through the removal of future targets of retaliation from the streets. Therefore, these expenditures could prove to be highly cost effective.

Adopt a Comprehensive Resource Mindset

Our impact evaluation could not specify which BPD reforms contributed the most to raising the homicide clearance rate. Our analyses suggest that the intervention increased the numbers of investigative personnel dedicated to homicide cases, computer checks on homicide places, collection and testing of physical evidence, witnesses interviewed, and other investigative activities. However, drawing on the broader literature on criminal investigations, we

would caution against developing a single investigative approach for detectives to execute in responding to all cases. The events that lead to a homicide victimization can be quite diverse. Therefore, criminal investigators should adopt a general but comprehensive approach to managing homicide investigations. In essence, investigators need to adopt a business model that leads to the construction of a robust “information chain” from witness statements and physical evidence that enhances their ability to hold offenders accountable.

The Problem-Oriented Policing Approach Works

BPD achieved the observed homicide clearance gains by engaging in a problem-oriented policing approach. With the aid of academic research partners, BPD analyzed homicide case characteristics that influenced clearances, identified gaps in its investigative and forensic practices and processes, and implemented reforms that were tailored to the nature of its homicide clearance problems. Other jurisdictions interested in improving clearance rates for homicides or other crime types should replicate this process rather than simply adopt specific tactics from the BPD approach. As suggested by Jarvis and Regoeczi (p. 10), “the most effective investigative practices must be determined from a synthesis of both community factors and individual case factors and molded to the particular

²³ M. Cohen and A. Piquero, “New Evidence on the Monetary Value of Saving a High-Risk Youth,” *Journal of Quantitative Criminology* 25, no. 1 (2009): 35–49.

²⁴ M. DeLisi, A. Kosloski, M. Sween, E. Hachmeister, M. Moore, and A. Drury, “Murder by Numbers: Monetary Costs Imposed by a Sample of Homicide Offenders,” *Journal of Forensic Psychiatry & Psychology* 21, no. 4 (2010): 501–513.

context in which these crimes occur.”²⁵ Expenditures on increased resources for homicide investigators need to be coupled with a systematic assessment of local conditions to ensure these investments are made wisely.

FINAL THOUGHTS

Although the Boston intervention suggests that homicide detectives can improve homicide clearance rates, additional rigorous field tests of problem-oriented approaches are clearly needed. Most research suggesting that post-crime investigative processes and practices impact offender apprehension consists of observational research²⁶ and outdated evaluations.²⁷ It is time for police executives, policy analysts, and scholars to resume efforts to improve this central component of police work.

In reforming investigative practices and processes, police executives will be forced to confront the powerful culture of detectives and the mythology that surrounds their work. Obviously, changing police organizations and their cultures is very difficult. As Dorothy Guyot famously described, creating change in police departments can be like

“bending granite.”²⁸ The process will take considerable political will and persistence by the chief executive and other key personnel in the department. However, as the reform work in Boston suggests, changing the deep-rooted detective culture is by no means an insurmountable challenge. BPD prioritized improving homicide clearance rates not by an announcement but by deliberative action and culture change. Its success demonstrates that the process is well worth engaging.

²⁵ J. Jarvis and W. Regoeczi, “Homicide Solvability,” *The Police Chief* 79, no. 8 (2012): 10–11.

²⁶ C. Wellford and J. Cronin, *An Analysis of Variables Affecting the Clearance of Homicides: A Multistate Study* (Washington, DC: Justice Research and Statistics Association, 1999).

²⁷ P. Bloch and D. Bell, *Managing Criminal Investigations: The Rochester System* (Washington, DC: The Police Foundation, 1976).

²⁸ D. Guyot, “Bending Granite: Attempts to Change the Rank Structure of American Police Departments,” *Journal of Police Science and Administration* 7, no. 3 (1979): 253–284.

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