

## Reducing Homicide through a "Lever-Pulling" Strategy

*Edmund F. McGarrell, Steven Chermak, Jeremy  
M. Wilson and Nicholas Corsaro*

The decade of the 1990s witnessed unexpected but welcome large declines in homicide and serious firearms violence. Yet, despite these declines, rates of firearms crime in the United States remain high compared to other western democracies and impose significant costs to society generally and to specific communities particularly. One promising approach to gun crime emerged in Boston during the mid-1990s. This approach combined face-to-face communication of a deterrence message to youth gang members with social service outreach and crackdowns on several gangs. Boston then experienced very significant declines in youth gun crime. This approach was later repeated in Minneapolis with similar promising results. This paper presents the results of a study of a similar gun-crime-reduction effort in Indianapolis. Time-series analyses suggest a significant decline in homicide similar to those observed in Boston and Minneapolis. Comparisons to six similar Midwestern cities revealed that Indianapolis was the only city to experience a significant decline in homicide. The results are discussed in the context of deterrence research and suggest the need to move beyond single-city evaluations of promising interventions.

*Keywords* reducing homicide; "lever-pulling" strategy; deterrence; United States

Edmund McGarrell is director and professor in the School of Criminal Justice at Michigan State University. He currently co-directs a National Institute of Justice-supported research project on Project Safe Neighborhoods. Recent articles have appeared in the *Journal of Criminal Justice* and the *International Journal of Comparative and Applied Criminal Justice*. Steven Chermak is an associate professor in the School of Criminal Justice at Michigan State University. His research interests include the presentation of crime in the news media, terrorism, and police strategies and innovations. Recent publications include *Searching for a Demon: The Media Construction of the Militia Movement*, *Media Representations of 9-11*, and *Famous American Crimes and Trials Volumes 1-5* as well as articles in *Justice Quarterly* and the *Journal of Criminal Justice*. Jeremy M. Wilson is a criminologist at RAND and an Adjunct Professor in the Heinz School of Public Policy and Management at Carnegie Mellon University. His recent studies include police-community relations, gun violence, establishing democratic police and justice institutions, and state and local counter-terrorism intelligence. Nicholas Corsaro is a doctoral student in the School of Criminal Justice at Michigan State University. His primary research interests include communities and crime, social disorganization theory, evaluation of gun-violence prevention programs, quantitative statistical techniques and research methodology. Correspondence to: Edmund F. McGarrell, School of Criminal Justice, Michigan State University, East Lansing, MI 48824, USA. E-mail: mcgarrel@msu.edu

## Introduction

The decade of the 1990s witnessed significant declines in firearms-related violence. Indeed, rates of homicide declined from 9.4 per 100,000 in 1990 to 5.5 in 2000 (Federal Bureau of Investigation, 2005). In absolute numbers, homicides declined from 23,438 to 15,586, a 34 percent decline through the decade. Yet, debate continues over the causes of the decline in rates of violence (Blumstein & Rosenfeld, 1998; Blumstein & Wallman, 2000). Some have suggested criminal justice policies such as increased incarceration and proactive policing. Others point to the healthy economy and improved employment prospects experienced throughout the decade.

One planned criminal justice intervention that appears to have had an impact on firearms violence, at least with respect to youth firearms violence, was the so-called "lever-pulling" strategy implemented by criminal justice officials in Boston in the mid-1990s (Braga, Kennedy, Waring, & Piehl, 2001; Kennedy, 1997, 1998; Kennedy & Braga, 1998; Kennedy, Piehl, & Braga, 1996; McDevitt, Braga, Nurge, & Buerger, 2003). A series of meetings were held with gang members thought to be at risk of being involved in gun violence. The meetings included a deterrence-based message that essentially said that if the groups continue to be involved in violence, all potential sanctions, or levers, would be applied to the group. The communication strategy was coupled with a crack-down on a violent gang in which the adult gang members were prosecuted in federal rather than state court. This crackdown was believed to have given credibility to the deterrence message.<sup>1</sup> The city of Boston experienced over a 60 percent decline in youth homicides following the intervention. This strategy was then applied in a very similar fashion in Minneapolis, and a federal crack-down on one of the city's violence-involved gangs was followed by a substantial reduction in homicide (Kennedy, 1998; Kennedy & Braga, 1998).

Based on the apparent success in Boston and Minneapolis, criminal justice officials in Indianapolis decided to implement a very similar strategy in late 1998 and early 1999. This paper is based on an evaluation of the Indianapolis project. Consequently, it provides an opportunity to test whether the lever-pulling strategy had an impact on homicide in a third city.

Assessing the potential impact of the lever-pulling strategy is critical because, despite the significant declines in firearms violence, it remains a significant problem in the United States. Moreover, recent studies indicate that violence is back on the rise in some communities (e.g., Wilson & Riley, 2004; Wilson, Hiromoto, Fain, Tita, & Riley, 2004). National Crime Victimization figures indicate that approximately 6 million individuals are victimized by crimes of violence annually (Bureau of Justice Statistics, 2001), and the Uniform Crime Reports show that there were approximately 1.4 million violent

1. The specific crackdown on the Intervale Posse gang was preceded by a crackdown on another gang and followed by several additional crackdowns on gangs believed to be involved in gun crime (Kennedy et al., 2001)

offenses reported to the police in 2003 (Federal Bureau of Investigation, 2005). Over 10,000 victims were murdered with guns, and guns were involved in over one-third of violent crimes in 1999 (Project Safe Neighborhoods, 2001). Miller, Cohen, and Wiersema's (1996; Cook & Ludwig, 2000) study of the costs of crime finds that personal crimes cost over \$100 billion annually in tangible losses, such as property damage and loss, medical and mental health care, productivity losses, and costs related to providing assistance to victims. Adding intangible losses, such as the amount of pain, suffering, and reduced quality of life caused by crime increases the costs of victimization to over \$450 billion dollars annually.

### Lever-Pulling and Focused Deterrence

One of the most intriguing criminal justice interventions implemented in the 1990s was "Project Ceasefire" that was part of a problem-solving initiative known as the "Boston Gun Project." Starting in 1995, a multi-agency working group of officials and researchers in Boston met to analyze, design, implement, and assess responses to violent crime (Braga et al., 2001; Kennedy, 1997, 1998; Kennedy & Braga, 1998; Kennedy, Braga, Piehl, & Waring, 2001; Kennedy et al., 1996; McDevitt et al., 2003). Analyses indicated that gang members with prior criminal justice system involvement committed most homicides. Indeed, the data suggested that approximately 1,200 gang-involved, chronic offending youths were responsible for at least 60 percent of the city's youth homicides. These chronic offending youths constituted approximately 1 percent of the city's youth population. The multi-agency working group attempted to deter future violent behavior of chronic offenders by informing them that violence would not be tolerated and would be met with an unprecedented law-enforcement response. The message was communicated directly to gang members through forums that have subsequently been referred to as "offender notification" meetings or "lever-pulling" meetings in cities that have adopted these practices. The gang members were told to report to the meeting by their probation officer and sometimes included gang members not on probation who were brought to the meeting by a streetworker or member of the clergy. The agencies backed up the message by using all legally available sanctions against the targeted offenders. The meetings were coupled with crackdowns on several gangs that remained involved in gun crime. One high-profile crackdown involved the Intervale Posse gang and included federal prosecution of the adult gang members. Although this action was not a planned component of the intervention, officials used this crackdown as evidence that they were serious about reducing violence and that the illegal use and possession of firearms by chronic offenders could result in long sentences in federal prison.

The results from research analyzing the impacts of this intervention are impressive. Violent gang offending slowed dramatically, and youth homicide in

Boston fell by two-thirds after the strategy was put into place (Kennedy, 1998, p. 3). The intervention also produced significant reductions in shots fired, gun assaults, and youth gun assaults. Braga et al.'s time-series analysis (1991-1998) examining monthly counts of youth homicide before and after the implementation of Project Ceasefire indicates a significant reduction in youth homicides. The results show a 63 percent reduction in the number of monthly homicides. Moreover, when comparing the results to 39 other cities, Boston experienced the largest statistically significant decline in youth homicide between 1991 and 1997 (Braga et al., 2001).

As noted above, following the Boston experience, Minneapolis officials implemented a very similar process whereby groups of chronic offending probationers were called into offender-notification meetings. City officials used the example of the federal prosecution of the "Boguz Boys" in much the same way that Boston officials presented the crackdown on the Intervale Posse. Minneapolis also experienced sharp reductions in homicide after having implemented the "pulling levers" strategy (Kennedy, 1998; Kennedy & Braga, 1998).

The Boston and Minneapolis lever-pulling interventions can be considered focused deterrence strategies that are based on several characteristics of both offending and the system response to offending. First, the strategy takes advantage of the long-established conclusion that a small number of offenders account for a disproportionate number of crimes (Moore, 1984). Thus, chronic offenders "le[ave] themselves open to an enormous range of sanctions, exactly because they [are] so highly criminal" (Kennedy, 1997, p. 461). Second, because the strategy is implemented and supported by a multi-agency working group, there are a variety of sanctions available to be used against the offenders. The involvement of many agencies focused on a specific problem should increase the severity and the certainty of penalties. Third, the approach includes directly confronting offenders by providing what Kennedy calls a "retail deterrence message" (Kennedy, 1998, p. 4). Offenders are told that gun-related offending will not be tolerated and informed about how the system will respond to violations of these new standards. Meeting with offenders is an important first step in altering their perceptions about sanction risk (see Horney & Marshall, 1992; Nagin, 1998). Fourth, such a strategy attempts to influence the informal communication networks of offenders. Interactions between offenders in jail and court, and on the streets may help spread information about new initiatives in place to respond to crime and how such programs might directly affect their activities. Deterrence scholars discuss how offenders are constantly revising their perceptions of the risks and rewards of criminal behavior based on new information (see Nagin, 1998, p. 16). The lever-pulling meetings and an affirmative follow-up response are the types of new information that may cause offenders to reassess the risks of committing crime.

Thus, there appears to be a theoretical basis for linking the declines in homicide in Boston and Minneapolis to the lever-pulling intervention. Consequently, it is important to assess similar interventions in other jurisdictions.

## The Indianapolis Lever-Pulling Initiative<sup>2</sup>

In late 1997, Indianapolis officials, including the Mayor, US Attorney, County Prosecutor, and Chief of Police, convened a meeting of all criminal justice agency heads to discuss the record-setting levels of homicide the city had experienced during the 1994-1997 period. Indianapolis had experienced success in reducing firearms violence in specific neighborhoods through a directed patrol experiment (McGarrell, Chermak, Weiss, 2002; McGarrell, Chermak, Weiss, & Wilson, 2001), and officials were thus sympathetic to the focused deterrence components of the lever-pulling strategy. They thus decided to implement the problem-solving strategy employed in Boston including the offender-notification meetings.

The lever-pulling program was part of what became known as the Indianapolis Violence Reduction Partnership (IVRP). The key components of the IVRP included a multi-agency working team, collaboration with a research partner, and application of formal problem-solving techniques to the homicide and gun assault problem. Since early 1998, a multi-agency coalition of criminal justice agencies, working with a variety of community partners, and committed to employing a strategic problem-solving approach, has been collaborating to assess the violent-crime problem and implement strategies in response to it. The coalition studied patterns of homicide and firearms violence in Indianapolis, crafted various interventions, assessed the impact of these interventions, and revised the strategy.

The analysis that supported the problem-solving approach initially focused on homicide patterns. Homicides from 1997 through August 1998 were analyzed based on official police records as well as through incident reviews. The incident reviews involved case-by-case reviews by homicide investigators, street and special unit (gang and drug) officers, federal law enforcement, federal and local prosecutors, and probation and parole officers. Members of the research team recorded the information shared during these meetings with particular attention to gang or group affiliations, drug involvement, and prior involvement in the criminal justice system by homicide suspects and victims.

The basic picture that emerged from these analyses was one of a high use of firearms involvement and considerable victim-offender overlap in terms of group involvement and prior criminal histories. Nearly 80 percent of homicide victims died of a gunshot wound. Homicide victims averaged 12.5 prior arrests, and homicide suspects averaged 11.5 prior arrests. The initial 206 victims and suspects from 1997 had been arrested over 1,600 times including 500 violent crime arrests and had over 800 convictions. Approximately 60 percent of the homicides involved a suspect, victim, or both who could be linked to a group of known, chronic offenders (gang or neighborhood crew). Over half the incidents

2. The Indianapolis initiative eventually became part of the Department of Justice's Strategic Approaches to Community Safety (SACSI) Initiative. The cities involved in SACSI ultimately implemented some variation of the lever-pulling strategy (Dalton 2003).

were drug-involved, not necessarily drug-motivated, but involving a known user, seller, or located at a known drug house.<sup>3</sup>

The problem analysis suggested to the IVRP working group that a focused deterrence strategy aimed at illegal gun carrying and use among known groups of chronic offenders, often involved in the drug trade, made sense. A key element of the strategy was communicating a deterrent message to high-risk offenders with the hope that they would in turn communicate it throughout their network of chronic offenders. A key component of the implemented strategy, borrowed from Boston's Ceasefire, was what became known as "lever-pulling" meetings. These meetings involved face-to-face meetings with groups of high-risk probationers and parolees. At the meetings, criminal justice officials and community members described their concern that the probationers/parolees were at high risk of either committing a violent crime or being a victim of a violent crime. A deterrence message was communicated with an explanation of the severe penalties available under federal law for felons in possession of a firearm and the commitment of local, state, and federal law enforcement to impose severe sanctions for firearms crimes. In addition, probationers and parolees were urged to take advantage of a range of services and opportunities including mentoring from ex-offenders, employment, housing, substance abuse, education, and vocational training. For over two and a half years, at least one lever-pulling meeting was held per month.

The initial lever-pulling meetings began in fall of 1998. From October 1998 through early summer 1999, nine lever-pulling meetings involving approximately 160 probationers and parolees along with eight follow-up meetings<sup>4</sup> with the same individuals were conducted. These meetings were complemented with a major federal-local intervention targeted at a criminal gang operating in the Brightwood section of Indianapolis. The coupling of the lever-pulling meetings, the arrests, and federal prosecution of a major gang was very similar to the lever-pulling strategy that included arrests and prosecution of the Intervale Posse in Boston and the Bogus Boyz in Minneapolis.

### The Brightwood Investigation<sup>5</sup>

On April 5th, 1999, a joint federal-local investigation culminated in a series of arrests of members of what was known as the Brightwood gang. The group of offenders targeted had ties to criminal activity throughout the city, but the investigation focused primarily on the drug market situated in an area of the

3. Details on the homicide analysis are available in McGarrell and Chermak (2003b).

4. The follow-up meetings were shorter, with fewer speakers. They reinforced the message of the original meeting. Where violence associated with the group or neighborhood had continued, the meetings often included the arrest of individuals who had violated conditions of probation or parole. Where there was no violence associated with the group or neighborhood, the meeting was held in a community setting and tended to have a more positive tone with community speakers likely to express their appreciation with the improved conditions in the neighborhood.

5. See also McGarrell and Chermak (2003a).

city known as Brightwood. The Brightwood neighborhood had long been a violent crime hot spot. The arrest, indictment, and eventual conviction of offenders controlling the Brightwood drug market was the product of a 10-month investigation conducted by a task force of law enforcement personnel from federal and local agencies. The United States Attorney's Office, the FBI, the IPD, the Marion County Sheriff's Department, local prosecutors, and several other local police departments were involved. The investigation included long-term surveillance of the major players, controlled drug purchases, and the use of wiretaps. The investigation concluded with the execution of 33 search warrants, the arrest of 16 individuals, and the seizure of 78 firearms, 12 kg of powdered cocaine, 500 g of crack, and over \$150,000 in cash.

Although this investigation was not a direct product of the IVRP, many of the law-enforcement officials responsible for this successful investigation were members of the IVRP working group. It also provided a good example of the potential of collaborative efforts between agencies. In addition, the "Brightwood Gang" provided an excellent example of the key factors driving the increases in the Indianapolis homicide problem in the 1990s—factors that were substantiated with the analysis of homicide and gun assaults patterns conducted by the IVRP research team. The Brightwood Gang was a tightly organized group of individuals working together to distribute crack and cocaine. Suppliers, mid-level distributors, and street-level sellers were arrested. This gang also used several "police spotters" to warn street-level distributors of police presence with cell phones. It was documented that they distributed nearly 50 kg of cocaine during the investigation period—a street value of about \$1.5 million. The primary objective of this group was profit-making, and they protected their turf and product with threats and acts of violent crime. These offenders had assault weapons, semi-automatic handguns, shotguns, pistols, and revolvers. The members of the gang were chronic offenders, well known as major players by federal and local authorities as well as the offending population. The individuals arrested had over 20 prior convictions for violent felonies, and nearly 70 convictions for other offenses.

The arrests and prosecution of this gang were exploited by members of the IVRP to accomplish its objective of communicating a "zero tolerance of violence" message to the offending population. Working-group members made a significant effort in the neighborhood where the arrests occurred to suppress activities of rival groups attempting to replace the significant gaps in drug supply. This included increased police patrol and outreach to several key community leaders to communicate directly with gang members about the increased law enforcement attention. In addition, they communicated to people living in these neighborhoods that the arrest was part of a new commitment to reducing violence in the neighborhood and across the city. Several lever-pulling meetings were held following the arrests. Working-group members that presented at these sessions used the Brightwood crackdown to describe how law enforcement was using a new collaborative approach to respond to violence in Indianapolis. The United States Attorney, for example, described

how the case against the Brightwood Gang was going to be heard in Federal District Court and described the amount of prison time that the defendants faced when convicted. Other law-enforcement officials and members of the community described how they were not going to stand for gangs terrorizing neighborhoods. This message, however, was coupled with concern for the probationers and parolees in attendance. Other speakers presented a message of hope and opportunities for change, encouraging the attendees to take advantage of the community resources and support that were present at the meeting.

### Method

To assess the impact of the crackdown on the Brightwood gang and the associated lever-pulling meetings, we employed time-series analyses of the trends in homicide across Indianapolis. The greatest threat to the validity of our Indianapolis findings is a main history effect, which we control for by examining homicides in six additional "no-treatment" cities.<sup>6</sup> Homicide data for these comparison sites were obtained using the Supplementary Victim-Level Homicide Database. The comparison sites (Cincinnati, OH, Cleveland, OH, Columbus, OH, Kansas City, MO, Louisville, KY, and Pittsburgh, PA) were chosen based on their Midwestern location and population. These seven cities run along a border from Interstate Highway 64 in the south to Interstate 80 in the north from Pittsburgh to Kansas City. They range in population from Louisville with a population of 256,231 to Columbus at 711,470. Due to its consolidated city-county government structure, Indianapolis is the most populous of the seven cities at 791,926. However, its center city, patrolled by the Indianapolis Police Department and accounting for approximately 80 percent of homicides, is just under 400,000 in population and thus quite similar to the comparison cities. We describe the time-series method in more detail as we present the findings.

### Time-Series Analyses—Homicide in Indianapolis

Time-series analyses were conducted for Indianapolis as well as six comparison sites to examine the changes in homicide patterns.

Indianapolis had experienced 149 homicides in the 12 months prior to April 5th. This declined to 101 in the next 12 months. The average number of homicides declined from 2.9 per week to 1.9 per week following the Brightwood crackdown. To further assess the potential impact of the IVRP lever-pulling strategy on firearms-related violence, we conducted an interrupted time series quasi-experiment. The analysis was conducted in accordance with modeling techniques developed by Box and Jenkins (1976). This entails identifying, estimating, and diagnosing autoregressive integrated moving average (ARIMA)

6. See Appendix A for a comparison of the seven Midwestern cities included in this study.

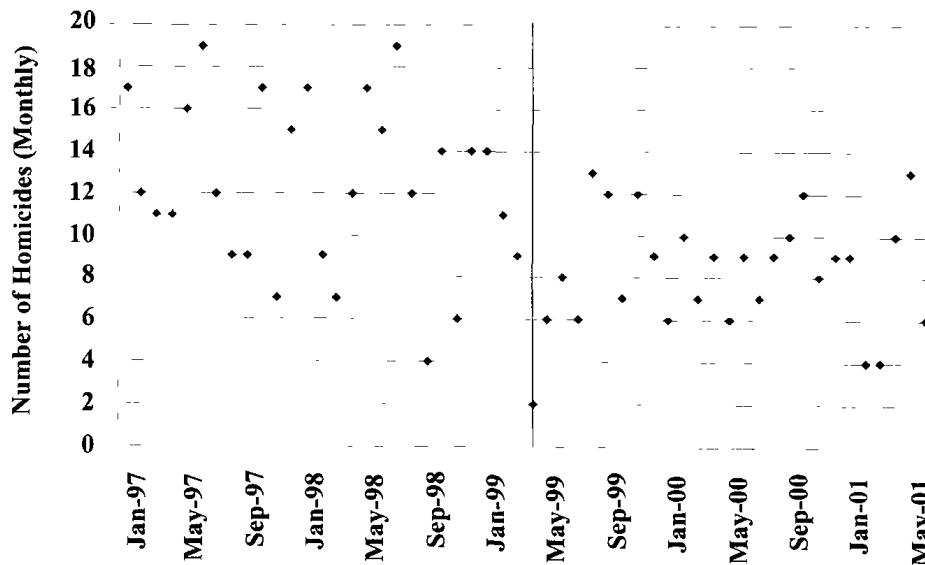
models in order to find the most appropriate stochastic model of the series prior to estimating the impact of the intervention.

The initial analysis examined the trend in homicides. The data allowed for aggregation into either weekly or monthly intervals. Monthly intervals allow for the detection of seasonality in the data and are not plagued by problems associated with frequencies of zeros. Attempts were made to model the series at both interval levels, and ultimately monthly intervals were chosen.

Each month was operationalized as running from its first through its last day. Utilizing data from January 1, 1997 to June 30, 2001 yielded a total of 54 months. Figure 1 shows the trend in homicides across both the pre-intervention and post-intervention periods, which comprised 27 months (the intervention was month 28).

The number of monthly homicides was plotted over the assessment period. The time plot indicated that the variance of the series was nonstationary in that it reduced over time. This could suggest that the trend in homicide was regressing to the mean and would have declined absent the intervention. To address this possibility, the data were transformed into their natural-logarithm form and replotted. By using the natural logarithm of the data in the time-series analysis, the trend was eliminated prior to our subsequent analyses.

This plot illustrated a considerable improvement in stabilizing the variance. Although the plot suggested that the data might have been following a downward trend over time, the autocorrelation function (ACF) and partial autocorrelation function (PACF) of the logged series indicated that there was no trend requiring to be modeled. In addition, the ACF and PACF revealed that there were no significant correlations at key lags, suggesting neither autoregressive nor moving average components (standard or seasonal) needed to be modeled.



**Figure 1** Number of homicides in Indianapolis, Indiana between January 1997 and June 2001.

Estimation of the impact of the intervention requires coupling both the noise parameters to account for autocorrelation in the data and a transfer function to capture the impact. Based upon the time plots and the ACF and PACF, the tentative model of this series requires no components to account for autocorrelation in the data. Therefore, the model contains only the transfer function to estimate the impact. Given the expectation that the intervention would reduce homicides immediately and sustain the reduction over the course of the evaluation period (which is also consistent with the time plot of monthly homicides), an abrupt, permanent transfer function was used to estimate the impact of the intervention. This entails introducing a dummy variable into the model, where 0 represents all pre-intervention time periods and 1 all post-intervention time periods.

Since there were no noise parameters to include with the transfer function, this model simply reduced to a bivariate regression of the natural logarithm of homicides each month on the dummy intervention variable. The F-test of this model was statistically significant ( $p < .001$ ), indicating that the model statistically explained variation in the natural logarithm of homicides per month. The  $R^2$  revealed that this model explains approximately 22 percent of the variation in the natural logarithm of homicides per month. The intervention was also statistically significant ( $p < .001$ ). The estimate of the impact, .42, signifies that at the time of the intervention, homicides declined immediately by 34.3 percent,<sup>7</sup> per month (see Table 1). Moreover, this reduction was sustained over the evaluation period.<sup>8</sup> By logging, or compressing the data, to fit the assumptions of the test, the analysis was essentially a mean comparison without the impact of a trend within the data. The finding of a significant reduction suggests that there was an immediate and abrupt reduction in the number of homicides in Indianapolis.

The appropriateness of this model was diagnosed by calculating the ACF and PACF of the model residuals. There were no significant spikes in either the ACF or PACF, and accordingly, the Box-Ljung Q-statistic, testing whether

Table 1 Time-series analysis for homicides in Indianapolis

City	Pre-intervention mean	Post-intervention mean	Mean difference post-pre	ARIMA model			Intervention coefficient	SE
				p	d	q		
Indianapolis, Indiana	2.46 (ln)	2.04 (ln)	-.42 (ln)				-.42***	0.11

\*\*\* $p < .001$ .

7. Since the data are in natural-logarithm form, we follow the following mathematical rule that transforms the coefficient to read as a raw percentage change: [exponent (-.42)] -1.00 .343 or 34.3 percent.

8. See Appendix B for a detailed discussion of the estimated time series parameters in Indianapolis.

the residuals as a whole are random, was not significant. Demonstrating that there was no autocorrelation remaining to be modeled, these tests established that the estimated model was proper, and no further adjustments were required.

### Homicide in Comparison Sites

First, we conducted an extensive number of estimated models, parameters, and transfer functions, using a systematic interactive process, for each of the cities. The findings presented in Table 2 represent the most appropriate model for each comparable homicide series. An advantage to this approach is that we were able to find the most appropriate estimated model for every site because each series is inevitably different. Similar to Indianapolis, we plotted data for each site over the assessment period in order to adjust for nonstationarity series. If a series had components of variance nonstationary, we used the natural logarithm of homicides in each month (Indianapolis and Pittsburgh). If a series suffered from mean nonstationarity, we used both first-order differencing (Louisville) and seasonal differencing (Cincinnati), if necessary.

Following the Box and Jenkins (1976) approach, we identified, estimated, and diagnosed ARIMA model parameters that best fit each independent series during the same time period as the Indianapolis study. In addition to the stationary adjustment, some models required autoregressive components while others required moving average components. We selected the most parsimonious series for each site. Additionally, we diagnosed the appropriateness for each series by examining the ACF and PACF model residuals and found that there were no significant spikes indicating there are no white noise parameters in any of the models. Among these sites, only Indianapolis had a statistically significant decline over this period.

It is also important to note that the findings presented in Table 2 represent a zero-order transfer function that assesses whether an abrupt, permanent change is found between pre-intervention and post-intervention. It begs the question, what if national homicide frequency gradually declined over this same period, perhaps more rapidly in Indianapolis, and that this could be an alternative explanation to the reduction in estimated homicides. We conducted a number of first-order transfer functions, or pulse functions that measure a gradual temporary change, for each city. We did not find any significant models for any of the series using this method.<sup>9</sup> The data presented in Appendix B, however, do indicate that the greatest reduction in homicide in Indianapolis occurred in the month following the Brightwood intervention. The impact had an immediate effect, which was sustainable over time. This is consistent with an explanation that attributes the decline in homicide to the impact of the

9. The only city that had a marginal effect was Indianapolis, Indiana. See Appendix B.

**Table 2** Time-series analyses for homicide by month across six cities plus Indianapolis

City	Pre-intervention mean	Post-intervention mean	Mean difference post-pre	ARIMA model				Intervention coefficient	SE
				p	d	q			
Cincinnati, Ohio	0.89	3.15	2.26	1	1, (12)	-	.08	.45	
Cleveland, Ohio	7.07	6.85	-.22	-	-	-	-.22	.71	
Columbus, Ohio	7.70	7.22	-.48	-	-	-	-.48	.88	
Indianapolis, Indiana	2.46 (ln)	2.04 (ln)	-.42	-	-	-	-.42***	.11	
Kansas City, Missouri	13.19	11.96	-1.23	-	-	-	-1.22	1.22	
Louisville, Kentucky	6.75	6.61	-.14	-	1	1	.03	.11	
Pittsburgh, Pennsylvania	2.06 (ln)	1.90 (ln)	-.16	-	-	-	-.15	.11	

\*\*\*p < .001.

intervention.<sup>10</sup> When coupled with the prior analysis of the Indianapolis time series using the natural logarithm of the data, the results suggest an abrupt decline in homicides beyond that attributable to regression to the mean.

### Summary

As noted above, the strategies developed by the IVRP involved a focused deterrence approach coupled with increased linkage to services for high-risk offenders. This included both suppression and intervention components that have been included in prior crime-reduction initiatives (e.g., see Decker, 2003; Sherman et al., 1997). The distinguishing characteristic of the IVRP approach was the attempt to use a problem-solving framework to focus these components on the key dimensions of the local firearms violence problem. What emerged was a focused deterrence lever-pulling strategy (Kennedy, 1998) that sought to focus limited criminal justice resources on firearms violence, to use both state and federal sanctions to deter illegal gun carrying and use, to communicate this strategy through as many venues as possible to those individuals believed to be most at risk for involvement in violence, and to link potential offenders to legitimate opportunities and services.

The evaluation of the IVRP intervention provides evidence that the IVRP process did lead to reduced levels of homicide. Specifically, the time-series analysis indicated that monthly homicides were reduced by 34.3 percent following the April 1999 intervention. When compared to the homicide trend in six other cities, Indianapolis was the only one that experienced a statistically significant change. Additionally, the impact was greatest during the month following the Brightwood gang crackdown, thus suggesting an intervention effect.

The most significant threat to the finding that the lever-pulling intervention had an impact on homicide is that the pre-intervention rates were exceptionally high and that the numbers were likely to decline absent any intervention ("regression to the mean"). This threat does not seem likely given that homicides had been at a fairly stable level from 1994 through early 1999. Yet, the data suggested a potential downward trend. Consequently, the time-series analyses that were conducted eliminated the trend in the data from the intervention assessment and continued to find a significant reduction in homicide. Thus, it does not appear to be the case that the results capture a short-term "peak" in homicides.

The additional factor that suggests that homicides were substantially reduced is the sudden decline in homicides following the intervention. Homicides

10. We also examined pre- and post-patterns of the characteristics of homicides. Homicides were less likely to involve guns, gangs, and drugs in the post-intervention period. They were also less geographically concentrated. Interviews with jail inmates suggested an increase in perceived certainty and severity of sanctions for gun crimes in the post-intervention period. The magnitude of these effects were all marginal but suggestive of an intervention effect. The findings are presented elsewhere (Chermak & McGarrell, 2004; McGarrell & Chermak, 2003a, 2003b).

dramatically declined in the spring and summer of 1999 and have been relatively stable since that time. We would anticipate that a regression to the historic mean would have resulted in a more gradual decline in homicides. This interpretation is supported by the analysis presented in Table 2 whereby the Indianapolis findings were consistent with a zero-order transfer function that tests for an abrupt shift in the series trend. It is also supported by the results reported in Appendix B that showed the greatest reduction was in the month following the intervention.

These findings are suggestive when considered in the context of recent studies finding that directed police patrol aimed at violent-crime hotspots may reduce fire-arms crime (Cohen & Ludwig, 2003; McGarrell, Chermak, Weiss, & Wilson, 2001; Sherman & Rogan, 1995). More directly, the findings of this study are also promising when read in light of the experience in Boston and Minneapolis (Braga et al., 2001; Kennedy & Braga, 1998; Kennedy et al., 2001). Combining Boston, Minneapolis, and Indianapolis, we see evidence from three cities experiencing group-related fire-arms violence that a lever-pulling strategy involving face-to-face communication of a deterrence message and a federal crackdown on a violent gang resulted in immediate and significant reductions in homicide. All three cities experienced what Kennedy has referred to as a "light-switch" impact on homicide.<sup>11</sup>

In addition to the nature of the specific interventions in Boston, Minneapolis, and Indianapolis, an additional common feature is that all three were part of a problem-solving approach whereby researchers were paired with practitioners. Patterns of homicide specific to each city were analyzed, and a focused deterrence strategy targeting these patterns of violence was implemented. These findings should be considered in light of other promising problem-solving crime-reduction interventions (e.g., Braga et al., 1999; Decker, 2003; Green, 1996; Weisburd & Green, 1995).

Given the threats to single-city evaluations of multiple component interventions, caution is appropriate in interpreting the results of the present study. On the other hand, the results across these three cities are quite consistent and promising in terms of the potential for reducing homicide. Clearly, there is a need for systematic experimentation<sup>12</sup> on the impact of lever-pulling interventions on homicide.

## Acknowledgments

This research was sponsored by grant award number 1999-7114-IN-IJ from the National Institute of Justice, US Department of Justice. Points of view or opinions expressed in this article are those of the authors and do not necessarily represent

11. It should be noted that the Minneapolis intervention was not subject to as rigorous an evaluation as was the case in Boston and Indianapolis.

12. For example, comparisons of the impact of a "gang crackdown" with and without the communication strategy of offender notification meetings.

the official position of the National Institute of Justice or the US Department of Justice. The authors wish to thank Christopher Maxwell, Director of the National Criminal Justice Data Archive, for his assistance in providing Supplemental Homicide Data.

## References

- Blumstein, A., & Rosenfeld, R. (1998). Explaining recent trends in US homicide rates. *Journal of Criminal Law and Criminology*, 88, 1175-1216.
- Blumstein, A., & Wallman, J. (2000). *The crime drop in America*. New York: Cambridge University Press.
- Box, G. E. P., & Jenkins, G. M. (1976). *Time series analysis: Forecasting and control*. San Francisco: Holden-Day.
- Braga, A., Kennedy, D. M., Waring, E. J., & Piehl, A. M. (2001). Problem-oriented policing, deterrence, and youth violence: An evaluation of Boston's operation ceasefire. *Journal of Research in Crime and Delinquency*, 38, 195-226.
- Braga, A., Weisburd, D., Waring, E., Mazerolle, L. G., Spelman, W., & Gajewski, F. (1999). Problem-oriented policing in violent crime places: A randomized controlled experiment. *Criminology*, 37, 541-580.
- Bureau of Justice Statistics (2001). *Criminal victimization 2000: Changes 1999-2000 with trends 1993-2000*. Washington, DC: US Department of Justice.
- Chermak, S., & McGarrell, E. F. (2004). Problem-solving approaches to homicide: An evaluation of the Indianapolis violence reduction partnership. *Criminal Justice Policy Review*, 15, 161-192.
- Cohen, J., & Ludwig, J. (2003). Policing crime guns. In J. Ludwig & P. J. Cook (Eds.), *Evaluating gun policy* (pp. 217-250). Washington, DC: Brookings.
- Cook, P. J., & Ludwig, J. (2000). *Gun violence: The real costs*. New York: Oxford University Press.
- Cook, P. J., & Ludwig, J. (2003). Pragmatic gun policy. In J. Ludwig & P. J. Cook (Eds.), *Evaluating gun policy*, (pp. 1-37). Washington, DC: Brookings.
- Dalton, E. (2003). *Lessons in preventing homicide*. [On-line] Project Safe Neighborhoods Report, Michigan State University. Retrieved June 22, 2005, from [http://www.cj.msu.edu/%7Eoutreach/psn/erins\\_report\\_jan\\_2004.pdf](http://www.cj.msu.edu/%7Eoutreach/psn/erins_report_jan_2004.pdf)
- Decker, S. H. (2003). *Policing gangs and youth violence*. Belmont, CA: Wadsworth.
- Federal Bureau of Investigation. (2005). *Uniform Crime Reports* [On-line]. Available: [www.fbi.gov/ucr/civs\\_03/xl/03tbl01.xls](http://www.fbi.gov/ucr/civs_03/xl/03tbl01.xls) (accessed 9/23/05)
- Green, L. (1996). *Policing places with drug problems*. Thousand Oaks, CA: Sage.
- Horney, J., & Marshall, I. H. (1992). Risk perceptions among serious offenders: The role of crime and punishment. *Criminology*, 30, 575-594.
- Kennedy, D. (1997). Pulling levers: Chronic offenders, high-crime settings, and a theory of prevention. *Valparaiso University Law Review*, 31, 449-484.
- Kennedy, D. (1998). Pulling levers: Getting deterrence right. *National Institute of Justice Journal*, July, 2-8.
- Kennedy, D., & Braga, A. A. (1998). Homicide in Minneapolis: Research for problem solving. *Homicide Studies*, 2, 263-290.
- Kennedy, D., Piehl, A. M., & Braga, A. (1996). Youth violence in Boston: Gun markets, serious youthful offenders, and a use-reduction strategy. *Law and Contemporary Problems*, 59, 147-196.
- Kennedy, D. M., Braga, A. A., Piehl, A. M., & Waring, E. J. (2001). *Reducing gun violence: The Boston gun project's operation ceasefire*. Washington, DC: United States Department of Justice, National Institute of Justice.

- McDevitt, J., Braga, A. A., Nurge, D., & Buerger, M. (2003). Boston's youth violence prevention program: A comprehensive community-wide approach. In S. Decker (Ed.), *Policing gangs and youth violence* (pp.77-101). Belmont, CA: Wadsworth.
- McGarrell E. F., & Chermak, S. (2003a). Problem solving to reduce gang and drug-related violence in Indianapolis. In S. H. Decker (Ed.), *Policing gangs and youth violence* (pp. 77-101). Newbury Park, CA: Wadsworth.
- McGarrell E. F., & Chermak, S. (2003b). Strategic approaches to reducing firearms violence: Final report on the Indianapolis violence reduction partnership. Final Report submitted to the National Institute of Justice. Retrieved June 17, 2005, from <http://www.ncjrs.org/pdffiles1/nij/grants/203976.pdf>
- McGarrell, E. F., Chermak, S. M., & Weiss, A. (2002). *Reducing gun violence: Evaluation of the Indianapolis police department's directed patrol project*. Washington, DC: United States Department of Justice, National Institute of Justice.
- McGarrell, E. F., Chermak, S., Weiss, A., & Wilson, J. (2001). Reducing firearms violence through directed police patrol. *Criminology and Public Policy*, 1, 119-148.
- Miller, T. R., Cohen, M. A., & Wiersema, B. (1996). *Victims costs and consequences: A new look*. Washington, DC: National Institute of Justice.
- Moore, M. (1984). *Dangerous offenders: The elusive target of justice*. Cambridge, MA: Harvard University Press.
- Nagin, D. S. (1998). Criminal deterrence research at the outset of the twenty-first century. In M. Tonry (Ed.), *Crime and justice: A review of research* (pp. 1-42). Chicago, University of Chicago Press.
- Project Safe Neighborhoods. (2001). *Project safe neighborhoods: America's network against gun violence. Implementation guide for PSN partners*. Washington, DC: United States Department of Justice.
- Sherman, L. H., & Rogan, D. P. (1995). Effects of gun seizures on gun violence: "Hot spots" patrol in Kansas City. *Justice Quarterly*, 12, 673-693.
- Sherman, L. W., Gottfredson, D., MacKenzie, D., Eck, J., Reuter, P., & Bushway, S. (1997). *Preventing crime: What works, what doesn't, what's promising*. Washington, DC: US Department of Justice, National Institute of Justice.
- Weisburd, D., & Green, L. (1995). Policing drug hot spots: The Jersey City dma (drug market analysis) experiment. *Justice Quarterly*, 12, 711-742.
- Wilson, J. M., Hiromoto, S., Fain, T., Tita, G., & Riley, K. J. (2004). *Homicide in San Diego: A case study analysis*. Santa Monica, CA: RAND, WR-142-OJP.
- Wilson, J. M., & Riley, K. J. (2004). Violence in East and West Oakland: Description and intervention. RAND Working Paper WR-129-OJP. Santa Monica, CA.

## Appendix A. Demographic, crime, and employment comparison for the seven cities used in the time series analyses

City, State	Population (2000)	Homicide total (January 1997- June 2001)	Homicide rate per 100,000 (average per year)	Violent-crime rate per 100,000 (1999)	Percent non-White (2000)	Percent persons below poverty (1999)	Un-employment rate (2000)
Cincinnati, Ohio	331,285	109	7.31	732.6	47	21.9	3.4
Cleveland, Ohio	478,403	376	17.46	1214.9	58.5	26.3	4.4
Columbus, Ohio	711,470	403	12.59	854.6	32.1	14.8	4.7
Indianapolis, Indiana	781,870	558	15.86	992.3	30.9	11.9	2.5
Kansas City, Missouri	441,545	679	34.17	1749.1	39.3	14.3	3.3
Louisville, Kentucky	256,231	236	20.47	862.9	37.1	21.6	3.3
Pittsburgh, Pennsylvania	334,563	423	28.01	877.6	32.4	20.4	4.1

Note. The general population and demographic figures, from the US Census Bureau, can be found at <http://quickfacts.census.gov>. The unemployment estimates, from the US Dept of Labor, can be found at <http://www.bls.gov/lau/lamtrk00.htm>. The homicide data are from the Supplementary Victim-Level Homicide Database. The violent-crime-rate measure is from the Sourcebook of Criminal Justice Statistics, 2000.

Appendix B. Examining the successive effect of the intervention

In order to assess the successive effect after the intervention month (month 28), we attempted to run a first-order transfer function model with the logged homicide data from Indianapolis. No model successfully estimated the logged data, so we relaxed the assumption of variance stationarity and used the first-order transfer function on the *raw count* of Indianapolis homicides. In order to address some of the nonstationarity problem, we differenced the series. This, we believe, gives us a good estimate of the successive effect. We were then able to model a first-order transfer function using homicide data in Indianapolis. We estimated the gradual effect on the raw number of homicides using the following equation,  $Y_t = (\omega_0 / (1 - \delta B)) I_t$ , where  $Y_t$  is the expected number of homicides per month in Indianapolis;  $\omega_0$  is the maximum likelihood estimated effect between pre-intervention and post-intervention at month 28 (-8.09);  $\delta B$  (.605) represents the gradual rate of decline over the successive months starting in month 29; and  $I_t$  is the transfer function. From this, we are able to determine that the greatest effect is at month 28, which is an estimated mean difference of -8.09 in the raw number of homicides between pre-intervention and post-intervention. At month 29, it is -4.89 and continues to decline. Figure B1 represents the decline over the subsequent 6 months after month 28 using this model. The important point is that the greatest reduction is at month 28, the initial post-intervention month. The reduction then gradually declines. This is consistent with explanations that the violence-reduction intervention produced the observed effect.

Because we were more comfortable drawing our conclusions from the logged series, as it accounts for variance nonstationarity, we present the logged series in the main findings section.

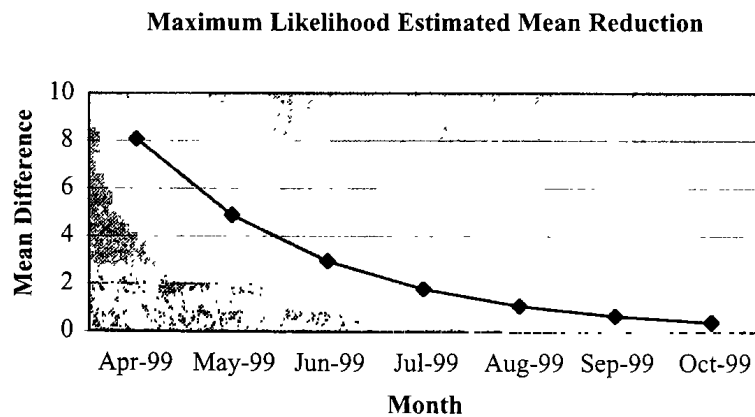


Figure B1 Estimated effect after intervention.