

**An Evaluation of the Nashville Drug Market Initiative (DMI) Pulling Levers Strategy\***

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## **Executive Summary**

In March 2008, the Metropolitan Nashville Police Department (MNPD), in cooperation with other city agencies, including the District Attorney, Public Defender, the Mayor's Office, the Sheriff's Department, social service providers, as well as faith-based and community leaders launched an innovative effort to eliminate open-air drug dealing and thereby significantly reduce crime in the McFerrin Park neighborhood. The initiative drew upon the experience of a similar effort in High Point, North Carolina as well as promising efforts to reduce gun crime that have been part of the national Project Safe Neighborhoods (PSN) and Drug Market Intervention (DMI) programs. The national research team for PSN from Michigan State University, including faculty at Southern Illinois University, were invited by the MNPD to conduct an independent evaluation of the initiative.

## **The Strategy**

The goal of the Nashville initiative is to break the cycle whereby drug dealers are arrested and prosecuted only to be replaced by another group of dealers. Rather, the strategy seeks permanent elimination of the drug dealing with corresponding reduction in crime and improvement in the quality of life within the neighborhood. The Nashville strategy involved a four-stage process. The initial phase known as the Identification stage involved systematic analysis of crime data indicating specific areas within Nashville that were victimized by high levels of drug dealing and associated crime. The McFerrin Park neighborhood was selected due to its high rate of violent, property, and drug crime as well as its high volume of calls for police assistance. Following selection of the neighborhood, MNPD began work on the second stage, the Preparation phase, which involved obtaining 'buy in' from law enforcement, prosecution, social service, and community personnel. After key members of the initiative agreed to move the strategy forward, twenty-six individuals were identified as being actively involved in drug sales. Evidence was gathered with the result of very strong prosecutorial cases being established against all twenty-six individuals. Of these offenders, a total of twenty were deemed to be chronic and serious offenders with a history of criminal violence. These individuals were prosecuted. The other six, however, were judged less serious offenders and were offered a second chance. The third phase of the intervention involved the Notification stage whereby the small group of offenders was informed that they could be prosecuted but were going to be offered a second chance with the contingency that their drug dealing stops and that the individuals remain crime free. The notification included participation of the offender's families as well as key social service providers who expressed their desire to see the notified individuals become productive members of the community. A variety of social services and social support were offered to the offenders. The final phase consisted of Resource Delivery and follow-up to provide support intended to help the small group of prior offenders avoid a return to drug dealing and crime. Additionally, a variety of efforts were taken to improve community collaboration with police and the overall quality of life within the neighborhood.

## **The Impact**

The impact evaluation consisted of comparing the trends in violent, property, and drug-related crime as well as calls for police assistance prior to- and after the intervention. We examined over five years of data for the McFerrin Park target area, the adjoining or contiguous areas, and the remainder of Davidson County for an overall trend comparison. Using a systematic time series analysis, the findings revealed that the target area experienced a statistically significant and sustained decrease of 2.5 property crimes per month (-28.4%), a reduction of nearly 55.5% in monthly narcotics offenses, and a decrease of 36.8% of drug equipment violations, as well as a significant reduction in calls for police assistance by nearly 18.1% per month following the intervention. The adjoining area experienced similar statistically significant and sustained declines in offense and calls for service that was observed in the target community, indicating that immediate crime displacement did not occur but in fact a diffusion of benefits was seen in the adjacent neighborhood. Comparatively, while these same offenses declined in the remainder of the greater Nashville area at the time of the intervention, this rate of change was neither statistically significant nor was as substantive (less than 10% for all outcomes modeled). Thus, the results indicate that there was a major and sustained decline in serious and drug related offenses as well as calls for service in the areas where the Drug Market Initiative (DMI) intervention was implemented, above and beyond any decline that was observed in the remainder of Davidson County. These findings suggest that the DMI intervention aimed at drug-offending in the McFerrin Park neighborhood was the driving force behind the decline observed in the target and contiguous areas.

## **Summary**

Open-air drug dealing is associated with high levels of crime and disorder and quality of community life. For years police and local residents in many communities have witnessed a cycle whereby drug dealers are arrested only to be replaced by another group of individuals drawn to the lure of the illegal drug economy. The DMI represents an innovative, community policing and problem solving effort to break this cycle and significantly reduce or eliminate the open-air drug market. Chronic and violent drug sellers are prosecuted but less serious offenders, those likely to serve as replacements in the drug market, are provided the opportunity to avoid prosecution as well as social support to pursue legitimate opportunities outside the illegal economy.

NMPD joins police departments in cities including High Point, North Carolina, Rockford, Illinois, Providence, Rhode Island, Hempstead, New York, and Milwaukee, Wisconsin that have implemented the DMI. Nashville represents the largest urban jurisdiction to have subjected the DMI to evaluation. Hence, the positive findings from this evaluation have important implications for other neighborhoods of Nashville as well as for cities across the United States.

## **Acknowledgements**

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## **Introduction**

The Office of the National Drug Control Policy program within the Executive Branch reported a federal budget expenditure of US\$14.8 billion in Fiscal Year (FY) 2009 to combat illegal domestic drug problems (Office of National Drug Control Policy, 2009). Of that, \$3.6 billion was allocated to domestic law enforcement, with an estimated 2.2% increased budget for law enforcement for FY 2010. The tremendous spending on drug law enforcement shows that there is a need to identify drug law enforcement strategies that have the potential capability to disrupt and reduce the prevalence of illegal drug markets in high crime neighborhoods.

As a result, a large number of law enforcement agencies have implemented strategies specifically targeted at drug hot spots (Coldren and Higgins, 2003; Green, 1995; Kennedy, 1993; Weisburd and Green, 1995). The use of proactive, problem-solving initiatives to deal with specific types of drug related crime has been implemented in a number of criminal justice organizations (Goldstein, 1990). The current study evaluates a Drug Market Initiative (DMI) “pulling levers” strategy used by the Metro Nashville Police Department (MNPd) in a target neighborhood in the eastern side of the city that was specifically designed to address open-air drug markets and related offending.

### The City of Nashville: A Contextual View

The Nashville-Davidson County area in Tennessee is home to over 545,000 residents, according to the 2000 U.S. Census, with an estimated population of over 619,000 as of 2007. The Nashville area is made up of roughly 473 square miles and inhabits nearly 1,150 people per square mile. The city of Nashville is housed in Davidson County. In terms of demographics, Nashville residents are roughly 65.9 percent white, have a median home income of \$39,200, and

nearly 81.1 percent graduated from high school. Nashville is the capital of Tennessee, and the county seat of Davidson County. Nashville is a consolidated city-county government. It is the second most populated city in the state behind Memphis.

In terms of the organizational structure of local law enforcement, the MNPDP employs over 1,290 sworn staff, and operates on an authorized budget of roughly \$151 million, as of 2007. Chief Ronal Serpas, Ph.D., was appointed command of the MNPDP in January 2004. The MNPDP closely follows an approach first introduced by Herman Goldstein (1990) by using strategic and proactive initiatives to combat crime in the city. Officials report that Nashville has strong inter-agency cooperation between police officers, city officials, social support services, and community development leaders to identify and manage individuals who participate in criminal offending. MNPDP can best be characterized as a proactive policing department that seeks to implement innovative strategies to reduce and prevent crime. In addition, MNPDP has relied on the use of CompStat data processing and analysis for strategic decision-making, and have worked extensively on the use of proactive policing techniques from a data-driven and evaluation standpoint (Serpas and Morley, 2008).

### Crime in Nashville

We examined crime measures from the latest available Uniform Crime Reports (UCR) database in 2006, as a way of providing context of Nashville crime rates. Nashville placed in the upper- quartile, or the top 25 percent, of all U.S. cities with a population over 100,000 for violent crime rate according to the 2006 Uniform Crime Reports (UCR). Violent crime was measured as a composite of all homicides, rapes, robberies, and aggravated assaults. In addition, the city placed in the third-quartile (top 50 percent) of all large U.S. cities in terms of their property

offense rate. A volume of criminological research suggests a robust connection between drug markets and property crime. Rengert and Wasilchick (1989) found that the ‘anchor point’ for drug-dependent property offenders is often the locale where they purchase illegal substances. Thus, while drug distributors may attempt to keep their sales a secret, they have little control over their customers’ activities (Rengert, 1996: p. 92). Research suggests that users who engage in burglary in order to obtain the means necessary to purchase drugs often orient their criminal activity in the direction of their drug distributor, to save time and effort (Pettiway, 1995; Rengert, 1996).

#### *Response to Drug Markets: The DMI Pulling Levers Strategy*

One law enforcement strategy that has gained increasing popularity over the past decade has been the use of a pulling levers intervention, which was established in Boston as a vehicle to reduce youth homicide and gun violence (Braga et al., 2001; Kennedy et al., 1997). In general, pulling levers employs a focused deterrence approach that uses a variety of sanctions to sway groups of chronic offenders from continuing their pattern of violent behavior. In addition, pulling levers strategies also include community-based action, social service, and opportunity provision components. Pulling levers strategies have previously targeted gangs and networks of chronic, violent offenders and frequently involve the use of interagency cooperation among practitioners from various criminal justice agencies and researchers alike. Key criminal justice agency leaders cooperate to inform identified offenders of the sanctions they face if they continue to engage in violent crime (Kennedy, 1997). Offenders are informed that there will be high inter-agency cooperation to seek the maximum penalty for continued offenses. Crackdowns on gang members and offenders that continue to engage in violent and gun crime have often been

used in combination with the deterrence-based meetings to increase the perceived threat of sanctions for illegal gun carrying and use (Braga et al., 2001; Kennedy and Braga, 1998; McGarrell et al., 2006).

The use of a police crackdown in conjunction with the pulling levers strategy often serves as evidence of the seriousness and commitment by key criminal justice officials. From a theoretical perspective, pulling levers as an intervention strategy can be considered a focused deterrence approach based on the characteristics associated with offending and the criminal justice system response to offending. Since the strategy is both implemented and supported by a multi-agency working group there are a variety of sanctions available that can be used against offenders. Thus, the involvement of many agency members focused on a specific problem should increase the severity and certainty of penalties, leading to alterations in perceptions about sanctions and risk. Deterrence scholars discuss how offenders are constantly revising their perceptions of the risks and rewards of criminal behavior based on new information (Horney and Marshall, 1992; Nagin, 1998). The pulling levers meetings and an affirmative follow-up response are the types of new information that may cause offenders to reassess the risks of committing gun crime.

In addition to the deterrence component, the pulling levers strategy also includes the use of prosocial groups, such as community and church leaders as well as social service providers to provide offenders a variety of positive program and lifestyle alternatives in addition to the deterrent message. The use of positive social groups is designed to reduce defiance (Sherman, 1993) and make offenders aware that their former actions are the target of the task force, not themselves personally. In addition, Rosenfeld and Decker (1996) proposed that the reliance on community members in a strategic program sends a clear message that continued offending

would not be tolerated when agents of the community are involved. Additionally, the prosocial groups attempt to link participants to legitimate services (e.g., employment, housing, mentors, drug treatment) and thus represent a form of social support (Cullen, 1994).

The pulling levers approach originated in Boston (see Braga et al., 2001, for a discussion) as a vehicle to reduce violent, firearm offenses, and youth homicide, the strategy has since been replicated in other U.S. cities including Baltimore, MD (Braga et al., 2002), Chicago, IL (Papachristos et al., 2007), High Point, NC (Coleman, 1999), Indianapolis, IN (McGarrell et al., 2006), Los Angeles, CA (Tita et al., 2003), Lowell, MA (Braga et al., 2008), Minneapolis, MN (Kennedy and Braga, 1998), and Stockton, CA (Braga, 2008; Wakeling, 2003). At the national level, Dalton (2002) describes how the pulling levers framework has been applied in a large number of U.S. cities and federal districts through the Strategic Alternatives to Community Safety Initiative (SACSI) and Project Safe Neighborhoods (PSN).

The previously listed studies suggest pulling levers has shown great promise to reduce gang, firearm, and overall violent crime. To this point most of the pulling levers strategies are relatively untested where non-violent, open-air drug markets are the focus of the strategy. One of the cities to use this approach to reduce open-air drug markets and related offenses was High Point, North Carolina, where the preliminary results appear promising (Frabutt et al., 2006). In addition, the High Point campaign was replicated in the city of Rockford, Illinois and a subsequent process and impact assessment showed a significant and substantive reduction in drug-related crime where the strategy was implemented (Corsaro, Brunson, and McGarrell, forthcoming).

Certainly, there has been a host of problem oriented policing interventions designed to reduce drug markets and related crime. Indeed the strategy employed in Nashville was

somewhat similar to other problem oriented policing initiatives such as the forging of police, citizens, and building inspectors used in the Jersey City Drug Market Experiment (Weisburd and Green, 1995; Mazzerole et al., 2006), Oakland's Beat Health Program (Mazerolle and Ransley, 2006), and the Drug Nuisance Abatement Program in San Diego (Clarke and Bichler-Robertson, 1998). However, along with High Point, NC, and Rockford IL, the city of Nashville was among one of the first communities to combine the pulling levers approach with related problem oriented policing tactics to address their unique and relatively non-violent drug-market problem. We examine the processes employed as well as the changes in crime related to the intervention strategy adopted by the MNPd to address open-air drug markets in a targeted community: the McFerrin Park neighborhood. The purpose of this paper is to assess whether the DMI pulling levers strategy has the potential to reduce non-lethal crime related to drug markets, which was the design of the Nashville initiative.

### **The Nashville Drug Market Initiative (DMI) Pulling Levers Intervention**

We examine four key stages in the DMI pulling levers strategy utilized in Nashville: 1) Identification, 2) Preparation, 3) Notification, and 4) Resource Delivery. The identification stage details the data-driven procedural analysis used by the MNPd to determine the neighborhood and individuals identified as chronic drug market distributors. The preparation stage revolved around creating intra- as well as inter-agency 'buy-in' for the strategy, often referred to as network-capacity building (Braga and Winship, 2006). The notification stage details both the crackdown stage, which was the sweep of individuals who were identified as chronic offenders and thus became targets of the crackdown, as well as the notification of the 'zero-tolerance/social support' message for those offenders who would be provided the opportunity to participate in the

'last chance' program. Finally, we detail the resource delivery stage that was particularly concerned with providing eligible offender with positive support mechanisms, a critical component of the mixed deterrence-social support strategy (Cullen, 2004).

### Identification

The identification stage was a key element in the strategic response to illegal drug markets. In early 2007, MNPD administration became aware of the High Point initiative in North Carolina. Based on the promise of the initial results of the High Point initiative (see Frabutt et al., 2006), and the fact there were some areas in Nashville that were also suffering from similar open-air drug market problems, MNPD decided to implement a program similar to the High Point initiative. Research analysts in Nashville examined a composite measure of index offenses, drug arrests, and drug complaints for the entire city. In terms of choosing the location for the proposed strategy, law enforcement decided to focus on the McFerrin Park community as their initial target area given the engagement of local residents with law enforcement seen in community groups. In addition, new residents had been observed moving into the neighborhood and there was a real sense of improving and revitalizing the area.

In terms of gathering intelligence, from the summer of 2007 through early spring 2008, a total of 55 cases were built against 26 suspects by the East Precinct Crime Suppression Unit, where officers made undercover buys that were predominantly filmed and audio-taped, which made them extremely useful for prosecution purposes. They also relied on additional sources of data including cooperating witnesses, narcotics complaints, and police surveillance. In essence, this investigation led to extremely tight cases built against chronic drug dealers in the McFerrin Park neighborhood.

It is important to note that the unit did not limit their focus strictly on individuals who resided in the drug hotspot area, but rather focused on individuals who were selling drugs in the community, regardless of where they lived. The prevailing questions concerned who would be eligible for the pulling levers call-in versus who would be prosecuted. After the investigation was complete, a single prosecutor from the District Attorney's Office, who was solely responsible for handling the prosecution for arrested offenders, along with investigators made the final recommendations regarding who would be eligible for the pulling levers notification and also who would be prosecuted. Ultimately five suspected dealers were chosen for eligibility in the intervention due to their non-violent criminal histories.

### Preparation

The preparation stage was not mutually independent, in terms of a time-sequence, from the identification phase of the program. In addition to identifying the target site and offenders within that site, which was a critical component to the program, MNPD also worked extensively to create 'buy-in' from law enforcement, prosecution, social service providers, community leaders (i.e., faith-based organizations), and community resident groups. Again, throughout the late fall 2007 and early spring 2008, administrative leaders from MNPD met with the District Attorney's Office, the Public Defender's Office, the General Session and Criminal Courts, the Mayor's Office, and the Sheriff's Department. They worked to ensure that key criminal justice personnel who were critical to implementing the 'pulling levers' component of the strategy (i.e., the deterrent-based message) were willing to be part of the intervention strategy.

In terms of obtaining buy-in from non-criminal justice personnel, MNPD relayed the intent of the project to community groups, residents, and faith-based leaders (i.e., parishioners) in

the McFerrin Park neighborhood on at least three occasions prior to the intervention that ultimately took place in March 2008. Residents in the target area were ready for a change in the community and were engaged with the idea of the High Point replication. In addition, a coalition was formed with local religious clergy and treatment providers during this same period. It is important to note, the local clergy and social service providers were instrumental in relaying the message to residents in the target area of the upcoming police strategy. In sum, the preparation stage informed all important key-stake holders of the idea and the strategy itself and took a serious amount of time and effort to create collaboration on many different levels. The sharing of ideas prior to actual program implementation (i.e., investigation, prosecution, and pulling levers deterrence message) was an important component to the Nashville initiative.

Finally, law enforcement provided treatment providers with research briefs conducted with the families of suspected drug offenders that were created from their investigation. The treatment providers then did follow-up visits with the individuals' families who were eligible for the DMI pulling levers call-in. The treatment providers were specifically concerned with working with the offenders' families in order to encourage attendance and participation at the meeting. In addition, a letter was addressed to each of the suspected offenders who were called to the notification meeting that provided assurance that each attendee would not be arrested at the meeting in an effort to increase the likelihood of attendance and to show the purpose of the program.

### Notification

On Monday March 17, 2008 the MNPD performed a 'crackdown' of arrests in the McFerrin Park target neighborhood that led to the capture and indictment of eighteen offenders,

with two others arrested shortly thereafter. Consistent with the pulling levers intervention, the law enforcement component was sudden and abrupt rather than a series of gradual arrests over an extended period of time. The local media also relayed the information about the law enforcement sweep of drug offenders to Nashville residents, both within- and outside of the target community. One week later, on March 24, 2008, the DMI pulling levers notification ‘call-in’ occurred in the East Precinct station, near the target community. Law enforcement, social service providers, five offenders, and invited members of the offenders’ families were all present at the meeting.<sup>i</sup> Local media were also present for the first half of the conference, which was a description of the deterrence, social service, and community reintegration component.

The offenders were shown a video that captured their prior drug-dealing on camera, which was gathered during the investigation phase of the initiative, in order to convey the leverage that the criminal justice agencies (i.e., police and prosecution) had on each offender. The Chief of MNPD as well as the Commanding Officer of the East Precinct both spoke to the offenders and their families and stated that this would be a turning point in their lives: they would either stop selling drugs and participate in the social service component of the program, or they would be arrested and prosecuted with all the drug charges compiled against them. In addition, all offenders were given a packet of that included an indictment for their drug-offenses. The local District Attorney stood before the group and stated the indictments would go in a drawer, to be either thrown away if they conformed to the rules of the program (i.e., no future arrests, rehabilitation, meeting with social service providers, etc.), or filled out and processed if they re-offended. In sum, this component is the ‘pulling levers’ part of the initiative because the criminal justice authorities indicated that every potential legal lever would be pulled if the offenders recidivated.

## Resource Delivery

After the deterrent message was relayed to the offenders as a group, each of the five individuals met individually with social service providers as part of a preliminary assessment panel. Individual needs were identified and specific strategies were crafted to assist each person where they had the most need (i.e., treatment, education and skills training, job-interview skills, etc.). In addition with their assistance with notifying the families of offenders, local church leaders were also instrumental in the resource delivery component. This component of the intervention also relays a long-term commitment to the McFerrin Park and surrounding community that the focus on reducing open-air drug offending is much more than a temporary strategy. It afforded residents an opportunity to see an immediate change in their neighborhood and allowed them to be part of the intervention by working with police to keep drug markets from re-emerging after time progressed. We summarize the action plan, or process component, of the Nashville intervention in Table 1.

*Table 1: Action Plan Implemented by the Metro Nashville Police Department*

<b>Strategy</b>	<b>Description</b>
Identification (Spring 2007)	Research analysts in the MNPD mapped crime data of index offenses, drug arrests, and drug complaints for the entire city.
Mobilization (Spring 2007)	Law enforcement officials determined that the McFerrin Park neighborhood would be the ideal locale for the DMI pulling levers intervention.
Preparation (Fall 2007–Winter 2008)	MNPD met with the District Attorney’s Office, the Public Defender’s Office, the General Session and Criminal Courts, the Mayor’s Office, the Sherriff’s Department, social service providers, and leaders of the faith-based community to ensure ‘buy-in’ across multiple agencies and providers.
Investigation (Summer 2007–Spring 2008)	East Precinct Crime Suppression Unit built a total of 55 cases against 26 suspected drug-dealers over the period of roughly one-year in the McFerrin Park area.

Incident Review (February 2008)	A task force comprised of the District Attorney as well as investigative officers conducted an incident review to determine which of the offenders would be selected for the DMI pulling levers intervention from the offenders who would be the target of focused-prosecution, which was heavily driven by the presence or absence of violent prior criminal histories.
Drug Arrest Sweep (March 17, 2008)	A law enforcement sweep was conducted that culminated in the arrest of eighteen drug-offenders who were responsible for selling drugs in the McFerrin Park target neighborhood. Two other targeted offenders were arrested shortly later. The strategy was designed to provide an immediate change to the community.
Pulling Levers Notification (March 24, 2008)	MNPD along with the District Attorney's Office conducted the DMI pulling levers 'mixed deterrence/social support' meeting with five drug-offenders and their families. A sixth offender was called in at a later date. After the initial notification phase, each offender met with social service providers for an immediate needs assessment where a strategy was crafted to suit each attendee's individual needs.
Community Notification (March/April 2008)	Law enforcement met with community groups, local businesses, and leaders of the faith-based community to disseminate information about the program. In addition, the task force worked with media outlets in Nashville to inform citizens in both the target community as well as the overall city of the strategy that was implemented in order to show how crime and the open-air drug markets in the McFerrin Park neighborhood had dissipated.

### **Analytic Framework**

Ultimately, the goal of the Nashville intervention was to reduce criminal offending and to make the McFerrin Park neighborhood more inhabitable. The current investigation is designed to assess the impact of strategies implemented by examining whether changes in criminal offending occurred in the target neighborhood, the adjoining (i.e., contiguous) neighborhoods, as well as the remainder of the city at the time of the intervention that was implemented by the task force. We present a rigorous statistical assessment of the Nashville DMI pulling levers initiative directed at disrupting drug markets in the McFerrin Park neighborhood.

### Trend Data

MNPD's data processing unit provided multiple sources of time series data that specifically captured the aggregated monthly number of crime incidents, drug offenses, and calls for service in the following Nashville areas: 1) the McFerrin Park target neighborhood to assess the local effect; 2) adjoining, contiguous areas to the McFerrin Park neighborhood to assess whether a local displacement or a diffusion of benefits occurred; and 3) the remainder of Davidson County, once the target and adjoining areas were subtracted from the county totals for general trend comparison purposes. All time series data were measured as monthly counts, where each month was operationalized as running from its first through its last day, between March 2005 and April 2009. This equates to fifty observations (thirty six pre- and fourteen post-intervention periods) for each dependent variable, which meets the appropriate observation size criterion for interrupted time series identification and estimation (Box & Jenkins, 1980).

Overall, there were five time series on the dependent variables of interest. *Violent* offenses were measured as the aggregated number of homicide, forcible rape, robbery, and aggravated assault incidents. *Property* offenses were measured as the sum of burglaries, larcenies, and motor vehicle thefts. These specific index offense data are submitted annually by the MNPD to the UCR system operated by the Federal Bureau of Investigation. *Narcotics* charges was operationalized as the number of monthly MNPD offense charges for illegal narcotics possession, and *drug equipment* offenses was measured as the monthly number of charges for drug-paraphernalia and related crimes. In addition, since it is well documented that incident and police data suffer from a number of methodological issues, most notably that not all crimes are reported and documented in official data sources, we also examined emergency dispatch generated calls for service data. Specifically, *calls for service* was measured as the total number of monthly citizen-initiated requests for police assistance or investigation, which was

generated by the Davidson County Emergency Communications Center. Taken together, these various forms of outcome measures are designed to capture a combination of crime incidents, drug related charges, and calls for police service. Finally, the dichotomous *intervention* variable (0 = pre-intervention, 1 = post-intervention) in the subsequent time series models was based on the implementation of the DMI pulling levers strategy in March 2008. It was during this specific month when twenty suspected drug offenders were indicted and arrested for illegal narcotics distribution, based on the results of the investigation, and six additional suspected offenders were ‘called in’ for the notification hearing (see Kennedy, 1997).

## **Methods**

Time series analysis was the primary quantitative analytic strategy, where we developed Autoregressive Integrated Moving Average (ARIMA) models to assess the impact of the DMI pulling levers intervention implemented in the McFerrin Park neighborhood. The interrupted time series design is regarded as a very powerful and useful statistical strategy in terms of modeling intervention impact (Bushway & McDowall, 2006). This approach allowed us to determine whether changes in the various outcome measures observed during the intervention period were significantly different from the pre- and post-intervention trends in the data while controlling for autocorrelation, seasonality, and mean and variance instability (McCleary & Hay, 1980). A limitation of the subsequent statistical analyses is the lack of available matched control areas within the city, which limits our ability to isolate true programmatic impact (see Britt, Kleck, & Bordua, 1996). According to MNPDP officials and researchers, the McFerrin Park area was substantially different than other Nashville neighborhoods, other than perhaps the adjoining area, in terms of the presence of open-air drug markets; thus, the intervention was implemented

in this community as a result. This makes a comparative neighborhood analysis difficult. In order to address this empirical limitation, we constructed ARIMA models for the target, adjoining, and perhaps most important to this issue, the net countywide trends in order to examine whether there was an overall general trend in Davidson County that may have influenced the intervention areas as well.

## Results

As an initial step, one way to examine whether crime incidents and calls for service changed following the DMI pulling levers intervention is to examine trends in the data. Figure 1 displays the narcotics and drug equipment trends, aggregated as total drug offenses, for the target and adjoining areas. The target and adjoining areas combined averaged 21.4 drug offenses per month before the intervention, and subsequently 11.2 drug offenses after the intervention. This equates to a 47.6 percent reduction in drug-related offenses.

Figure 1: Drug offense trends

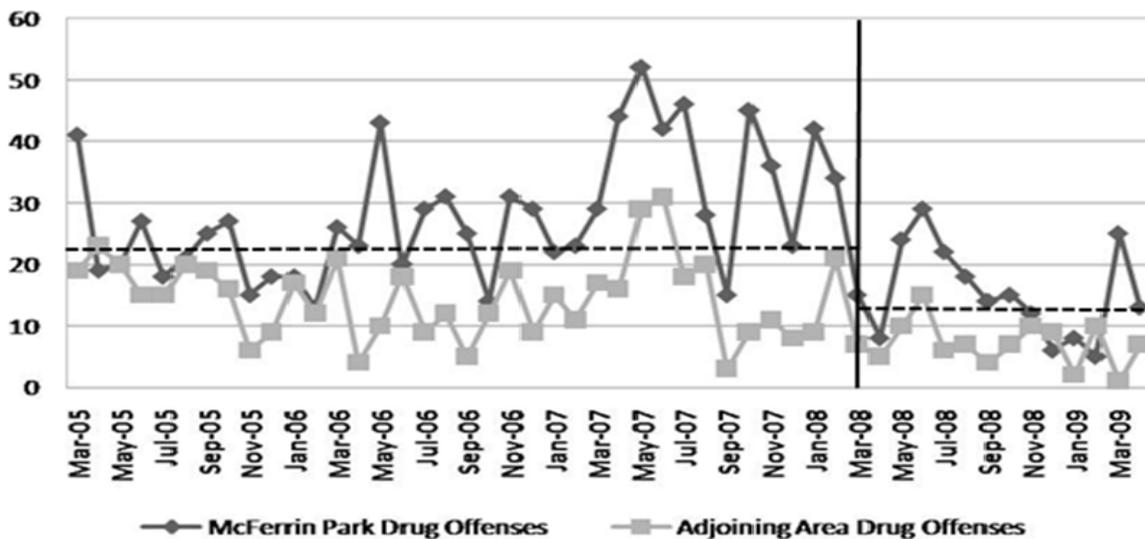


Figure 2 displays the UCR crime trends, aggregated as all part I offenses (i.e., the sum of both violent and property UCR crimes) for the target and adjoining areas. The target and adjoining areas combined averaged 13.8 UCR offenses per month before the intervention, and subsequently 10.2 UCR offenses per month after the intervention. This equates to a 25.8 percent reduction in UCR offenses.

Figure 2: Part I UCR offense trends

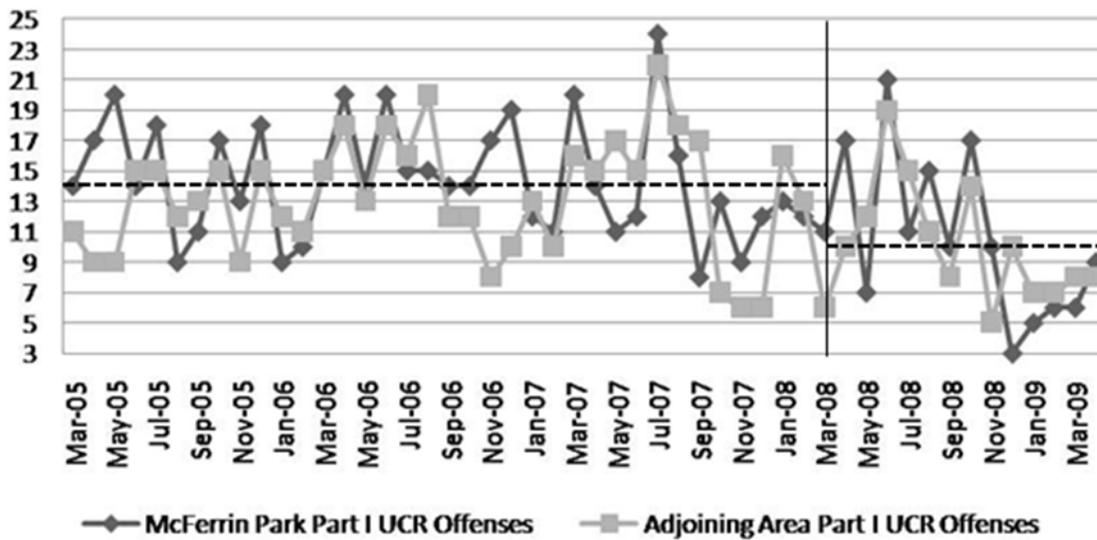
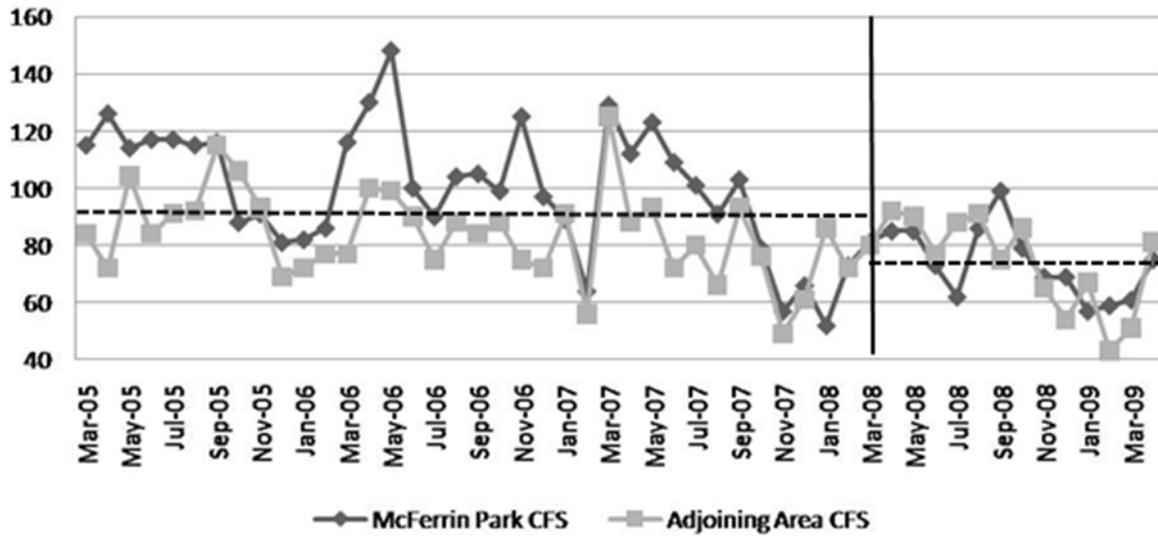


Figure 3 displays the trends for calls for police service/assistance (CFS) for the target and adjoining areas. The target and adjoining areas combined averaged 92.0 CFS per month before the intervention, and 74.2 CFS per month after the intervention. Thus, the change in CFS per month was a 19.3 percent reduction between pre- and post-intervention.

Figure 3: Calls for service trends



At the bivariate level, Table 2 displays the average as well as percentage changes across the different outcome measures between pre- and post-intervention. Violent offenses decline by 23.6 percent in the target area and 24 percent in the adjoining area, compared to a 7.4 percent reduction seen in the remainder of the county. A similar change was seen in property offenses. Drug equipment and narcotics violations also reduced substantially after intervention in the McFerrin Park neighborhood and adjacent area, with declines of greater than 39 percent for each offense type in either location. Comparatively, the rest of Davidson County experienced either a moderate decline (9.3 percent) in drug equipment charges or a moderate increase (5.5 percent) in narcotics violations. Finally, calls for service declined by 26.1 percent in the target neighborhood, while the adjoining area and remainder of the county experienced more modest declines by 6.2 percent and 5.9 percent respectively. Thus, while most of the outcome measures examined here went through a decline in the remainder of Davidson County, except for narcotics violations, the changes in violent, property, drug incidents, and calls for service were substantially greater at, or near, where the DMI pulling levers intervention was implemented.

Table 2: Change in the monthly incidents, offenses, and calls for service counts

Location	Violent			Property			Drug Equipment			Narcotics Violations			Calls For Service		
	Pre-mean	Post-mean	% $\Delta$	Pre-mean	Post-mean	% $\Delta$	Pre-mean	Post-mean	% $\Delta$	Pre-mean	Post-mean	% $\Delta$	Pre-mean	Post-mean	% $\Delta$
Target Area	5.5	4.2	-23.6	8.8	6.3	-28.4	10.9	6.6	-39.5	17.1	8.6	-49.7	100.2	74.0	-26.1
Adjoining Area	5.0	3.8	-24.0	8.2	6.1	-25.6	4.6	2.2	-52.1	10.0	4.9	-51.0	83.7	78.5	-06.2
County Remainder	729.9	675.6	-07.4	2895.4	2691.0	-07.0	495.9	449.6	-09.3	876.5	925.0	05.5	5060.1	4758.6	-05.9

## ARIMA Time Series Results

All subsequent time series estimates were obtained with the use of SAS software, version 9.2.<sup>ii</sup> ARIMA time series modeling relies on a three part strategy: First, the series being modeled is examined, and transformed where necessary into a set of observations that has mean and variance stationarity (i.e., stability), often referred to as modeling a ‘white noise’ process. This step is designed to minimize the possibility that the intervention being examined does not simply capture a bias, or a regression toward the mean, in an already changing time series. Second an appropriate transfer function is included to assess program impact in the ‘de-trended’ series.

The results of the time series analyses were consistent with our expectations that the McFerrin Park and adjoining area experienced an abrupt, immediate, and sustained decline in the outcomes modeled, while the remainder of Davidson County did not experience a significant change in any of the measures after March 2008, regardless of model type. All models presented met the requirements of the residual diagnostic checks; specifically none of the Box-Ljung Q-residual statistics were statistically significant in the models. The intervention estimate in each model can be read as the change in the outcome after the Nashville DMI pulling levers intervention was implemented.

Table 3 presents the results of the zero-order, permanent transfer function models. The results are clear and consistent. Controlling for the long-term stochastic processes that influence the dependent series, property crime, narcotics and drug equipment offenses, and calls for service in the McFerrin Park neighborhood and adjoining area experienced immediate and statistically significant declines that coincided with the implementation of the DMI pulling levers strategy. In addition, there is no evidence that there was an overall trend in the greater Nashville area that was responsible for the observed and significant reductions seen in the target and adjacent areas.

Table 3: Zero-order, abrupt, permanent transfer function ARIMA models

Series	Model <sup>a</sup>			Intervention Coefficient	Standard Error	T	P	AIC
	p	d	q					
<i>Target Neighborhood</i>								
Violent Incidents	0	0	0	-1.36	0.903	-1.51	.12	249.2
Property Incidents	0	0	0	-2.50	0.926	-2.70	<.01	254.5
Narcotics Offenses <sup>b</sup>	0	0	0	-0.81	0.168	-4.80	<.01	80.1
Drug Equipment Offenses <sup>b</sup>	0	0	0	-0.46	0.173	-2.64	<.01	192.1
Calls for Service <sup>b</sup>	1	0	0	-0.20	0.120	-1.65	.09	23.4
<i>Adjoining Area</i>								
Violent Incidents	0	0	0	-1.19	0.894	-1.35	.17	247.7
Property Incidents <sup>b</sup>	1	0	0	-0.30	0.180	-1.68	.09	56.4
Narcotics Offenses <sup>b</sup>	1	0	0	-0.70	0.226	-3.12	<.01	93.9
Drug Equipment Offenses <sup>b</sup>	0	0	0	-0.52	0.210	-2.45	.01	126.8
Calls for Service <sup>b</sup>	0	0	0	-0.01	0.006	-1.96	.05	14.0
<i>County Remainder</i>								
Violent Incidents <sup>b</sup>	1	0	0	-0.02	0.084	-0.24	.81	71.5
Property Incidents <sup>b,c</sup>	1	0	0	-0.05	0.383	-0.15	.88	82.7
Narcotics Offenses <sup>b</sup>	1	0	0	0.05	0.042	1.29	.19	88.0
Drug Equipment Offenses <sup>b</sup>	1	0	0	-0.10	0.068	-1.52	.12	83.0
Calls for Service <sup>b,c</sup>	1	0	0	-0.01	0.030	-0.34	.73	130.1

<sup>a</sup>The general form of the ARIMA model is (p, d, q): where p is the autoregressive parameter, d is the order of differencing, and q is the moving average parameter. All trend components were statistically significant (p < .05).

<sup>b</sup>Natural log transformation to adjust variance non-stationarity, seen in the augmented Dickey Fuller Unit Root test.

<sup>c</sup>These dependent variables experienced statistically significant annual seasonal trends, which we estimated as (1, 0, 0) x (0, 1, 0)12 models, where all diagnostic assumptions were met.

In McFerrin Park there was an abrupt decline of roughly 2.5 property offenses per month (-28.4 percent) following the DMI pulling levers initiative. Similarly, narcotics offenses went through a reduction of nearly 55.5 percent and drug equipment violations decreased by 36.8 percent.<sup>iii</sup> Finally, calls for service requesting officer assistance declined by 18.1 percent per month in the same area. Interestingly, violent offenses did not experience a statistically significant decline in any model examined. Thus, a vast majority of property incidents, drug offenses, and calls for police assistance experienced immediate and sustained decreases after the initiative was implemented in the target area.

In the adjoining area, property offenses experienced a statistically significant decline of 25.9 percent, while narcotics incidents reduced by 50.3 percent. Drug equipment offenses also experienced a significant decrease of 22.2 percent after the intervention. Calls for service in this area also experienced a statistically significant decline, but the estimated change was relatively small at roughly 1 percent. Finally, similar to the effect seen in the target area, violent offenses in the adjoining area also experienced a reduction but not to the level of statistical significance. In sum, these results suggest that there was not an immediate displacement of drug-related offending to the adjacent neighborhoods.

Comparatively, the remainder of Davidson County also experienced a reduction in many of the same offenses, except for an increase in narcotics offenses, but these declines did not approach statistical significance in any model examined. The decrease in crime and calls for service in the target and adjacent areas was well beyond that experienced in the remainder of the Nashville area, both in terms of magnitude and statistical significance. Thus, there is no evidence there was a general trend in crime in Nashville that would account for the immediate, sustained, and significant reduction in crime and calls for service that was experienced in the target and adjacent communities.

## **Discussion**

The results from this evaluation indicate that criminal offenses, drug offenses, and calls for police service in the McFerrin Park and adjoining neighborhoods experienced a statistically significant and substantive decline following the March 2008 DMI pulling levers strategy. Controlling for seasonal effects, we found that property offenses declined in McFerrin Park by roughly 2.5 total offenses per month after the Nashville DMI campaign was implemented.

Similarly, narcotics offenses experienced a reduction of nearly 55.5 percent and drug equipment violations decreased by 36.8 percent after the intervention was implemented. Calls for service requesting officer assistance declined by 18.1 percent per month in the same area. This statistical analysis also indicated that the change in crime rates was sustained, at least from a 12 month post-intervention analysis. Similar reductions were experienced in the adjoining neighborhood, which indicated that a diffusion of benefits was observed in the contiguous neighborhoods. That is, there was no evidence of a displacement or shift of drug offending to the nearby neighborhood but rather a reduction in crime rates that mirrored the one experienced in the target community. Finally, the remainder of Nashville did not experience a similar reduction in these outcome variables as was seen in the target and adjacent areas, which indicates there was not a general trend that would likely have influenced this observed shift in crime and calls for service rates in McFerrin Park. Thus, we conclude that the substantive, significant, and sustained reduction in crime and related nuisances coincided with the Nashville DMI campaign.

Although the current evaluation did not systematically address neighborhood perceptions of the impact of the intervention, conversations with neighborhood leaders, city officials, and media outlets indicate a dramatic improvement in the quality of life. Open drug dealing is reported to have been eliminated and social and physical disorder reduced. Further investigation of these impressions are planned to be implemented by the research team.

Additionally, there are several limitations of the current study that should be noted. We would ideally have control site data available in order to compare offense trends in order to minimize the concern that the observed reductions in crime in the McFerrin Park neighborhood were due to external factors. Indeed, the uses of experimental or quasi-experimental designs are well-suited methodological strategies for program assessment (Cook and Campbell, 1979).

Unfortunately, there was no other area in Nashville that was substantively similar in terms of being a ‘hotspot’ of criminal activity. However, given that our target and adjoining statistics differed greatly from the overall city trends, we do not believe this empirical limitation heavily compromises the validity in our impact assessment.

These limitations aside, in terms of contributions to the literature, the use of the pulling levers strategy is well established in the criminal justice literature as a promising problem oriented policing strategy, particularly well suited to reduce gun, gang, and lethal violence. The MNPD and its subsequent social and justice organizations implemented a strategy in a rigorous and detailed manner that was consistent with the traditions and the framework of the approach. The research from the Nashville study has great promise to improve the growing body of research designed to assess the utility of the DMI pulling levers strategy. In addition to its promise as a strategic response to reduce violence, homicide, and gun-crime (see Braga 2008; Braga et al., 2001, 2002, 2008; Kennedy, 1997; Kennedy and Braga, 1998; McGarrell et al., 2006; Papachristos et al. 2007), results from Nashville indicate that the pulling levers strategic intervention has great promise to reduce non-lethal crime related to open-air drug markets. Our research shows that crime associated with open-air drug markets significantly reduced following its implementation in McFerrin Park and adjacent areas. Future research from additional sites would heavily improve our understanding of the DMI pulling levers campaign as a viable approach to reduce open-air drug markets. The results of the Nashville intervention indicate that future DMI initiatives and subsequent research on these campaigns is warranted and necessary.

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<sup>i</sup> A sixth candidate who was unavailable for the group notification was 'called-in' within the month. While the group setting was absent in this case, the same message was given.

<sup>ii</sup> The augmented Dickey-Fuller unit root tests, designed to assess the stationarity of a time series, were conducted with E-Views software, version 4.1.

<sup>iii</sup> All percentage estimates were calculated using exponentiation on the (naturally) logged coefficients. For example, the narcotics offense reduction of 55.5 percent was calculated as follows:  $[\exp(-0.81) - 1] = 0.444 - 1 = -55.5\%$ .