

The Weed and Seed Initiative and Crime Displacement in South Florida:

An Examination of Spatial Displacement Associated with Crime Control Initiatives and the Redevelopment of Public Housing

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research for safer communities



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Section One. Introduction

Intent of the Report

The goal of this study is to assess the displacement effects of crime reduction efforts and quality of life improvements undertaken in Weed and Seed target neighborhoods in Miami, Florida. Weed and Seed is a U.S. Department of Justice initiative aimed at preventing, controlling, and reducing violent, drug, and gang activity in high-crime areas. Law enforcement agencies and prosecutors work together to “weed out” criminals from the target area. Human services, or “seeding” efforts, bring prevention, intervention, treatment, and neighborhood revitalization to the area. Community-oriented policing bridges weeding and seeding efforts. These components seek to reduce criminal opportunities for potential perpetrators and those perpetrators who have not been apprehended, and at the same time, increase the overall quality of life in the targeted neighborhoods.

Central to the Weed and Seed initiative—or any crime prevention initiative—is the expectation that the initiative will prevent crime. Local partners or evaluators typically measure changes in crime within the target area before and after the implementation of the program or intervention to examine whether crime was prevented. Also central to crime prevention is understanding and measuring whether and how crime was displaced from the target area as the result of the program. Displacement of crime refers to changes in crime patterns that occur because offenders adapt their behavior as a result of some change in opportunities for offending. Change in opportunities can result from a variety of crime prevention activities—from police enforcement related activities and resident-centered changes (e.g., a new crime watch program) to physical changes to the environment (e.g., the closing of a liquor store or the addition of street barricades). Criminology and sociological theories support the concept of displacement through two general premises: (1) when increased police enforcement reduce some types of opportunities, other types of opportunities for offending may increase since police have limited resources; and (2) crime is opportunistic: potential offenders seek out opportunities for crime (Felson and Clarke, 1998). Measuring displacement becomes a critical aspect of crime control particularly when an intervention is focused on a small geographic area and when the intervention has a heavy enforcement component.

Although Weed and Seed sites and the Department of Justice agency that administers Weed and Seed, the Community Capacity Development Office (CCDO), maintain statistics for crime changes within the targeted areas, the sites are not responsible for examining potential displacement. Not surprisingly, measuring displacement is complex—there are many types of displacement, and displacement is not easy to detect among the myriad of reasons for fluctuations in crime rates. In this report, we focus on the *spatial displacement* of crime. Our intent is to examine whether criminals or potential offenders moved their activities to another location after: (1) a large Weed and Seed-related crackdown in the Liberty City neighborhood in January 1999 on two notorious drug gangs; and (2) the closing of the Scott/Carver Homes public housing development in Liberty City.

Types of Displacement and Attendant Issues

The criminological literature recognizes six types of displacement:

- Spatial – offenders may simply commit crimes somewhere else (another neighborhood, or a nearby jurisdiction);
- Tactical – the same kind of crimes may be committed in the same geographic area, but in a way that evades the impact of the law enforcement intervention;
- Temporal – the same kind of crimes may be committed in the same geographic area but at different times;
- Target redirection – crimes may be perpetrated against different targets in the same area;
- Functional – perpetrators may switch from one type of crime to another, again in the same area;
- Perpetrator replenishment – new offenders may simply step in to fill the gap created by the intervention, also in the same area.

These possibilities constitute serious challenges to prevention and law enforcement activities, but are difficult to measure and assess. Consequently, they have been the focus of a good deal of debate among researchers and practitioners. Some argue that displacement always occurs because perpetrators not apprehended are going to continue their criminal lives, one way or another. Others argue that it rarely occurs, at least in the short run, because perpetrator mobility is often low and local opportunities are curtailed. What seems clear is that law enforcement agencies, and the neighborhoods they seek to protect, will benefit from a greater understanding of what actually does take place when an intervention is undertaken. Addressing that need is the primary focus of this research.

The idea for the study originated from conversations Urban Institute researchers had several years ago with Weed and Seed officials at the Department of Justice as well as local Weed and Seed partners about the mobility of gangs in urban corridors. At the time, a number of Weed and Seed sites around the country were demonstrating reductions in homicide in Weed and Seed target areas. Critical observers noted that homicides and violent crime were down in most parts of the country and discussions abounded about whether Weed and Seed activities had a direct part in decreasing homicides. Simultaneously, anecdotal evidence appeared to suggest that new gang violence was emerging in other (non-Weed and Seed) neighborhoods of racially and ethnically diverse urban areas such as Los Angeles, Miami, and Washington, D.C. Urban Institute researchers sought out the opportunity to examine, using rigorous statistical methods, the impact of Weed and Seed-related activities in and around Weed and Seed neighborhoods.

Miami-Dade County was selected as the research site because it provides the opportunity to examine the impact of a Weed and Seed-related gang crackdown using a quasi-experimental evaluation design. Furthermore, Miami-Dade County was undergoing somewhat of a natural experiment at the same time in their Weed and Seed site—a large, high-crime public housing development in Liberty City was closing down as part of the U.S. Department of Housing and Urban Development's (HUD) HOPE VI initiative. HOPE VI (Housing Opportunities for People Everywhere) is an initiative designed to eradicate severely distressed public housing. Revitalization is achieved through three general areas: (1) physical improvements, (2) management improvements, and (3) social and community services to address resident needs.

Throughout the phased closing of Scott/Carver Homes (September 2001 to July 2005), a number of police officials reported that, as a result of the closing, crime is migrating to other public housing developments in the county. In addition to these two initiatives taking place,

Miami has had a funded Weed and Seed site since 1997. Geographic data on crime were available for a lengthy time period—roughly eight years—spanning a period both before and after Weed and Seed activities began, as well as before and after the first phase of housing relocation for Scott/Carver Homes. Given the availability of these crime data, three central research questions guide this report:

1. What is the impact of the 1999 Weed and Seed-related gang crackdown in Liberty City?
2. Is there any evidence that spatial displacement of violence and drug activity occurred after the crackdown?
3. Does the closing of a large high-poverty public housing development in Liberty City influence patterns of crime in and around the public housing development?

The report is organized as follows: Section Two provides a detailed backdrop for this report. We first provide background information on the Weed and Seed initiative and discuss evaluation results. We then review the displacement literature and provide a more detailed discussion of spatial displacement. We discuss the key studies, the types of data needed to examine spatial displacement, and the relative merits of the various methods. Next, we discuss what is known about crime in and around public housing and summarize the literature related to displacement and public housing. Then, we discuss the present study and the Weed and Seed efforts in one Miami neighborhood. Section Three describes the methodology used in this study, including the hypotheses tested, the data used, and the analytical strategy. Section Four provides the results of the study and Section Five concludes the report with a recap of the findings and a discussion of implications drawn from the findings.

Section Two. Background

The U.S. Department of Justice’s Weed and Seed Initiative

In 1991, the U.S. Department of Justice established Operation Weed and Seed, a community-based, multi-agency approach to law enforcement, crime prevention, and neighborhood restoration. The Weed and Seed strategy is based on collaboration, coordination, and community participation by integrating current Federal, State, and local criminal justice efforts and social services. The goal of the collective process is to gain permanent communication and partnership among stakeholders, as well as additional resources and support for the strategy. Coordinating government agencies and community organizations enables a concentration of resources and a better match of services with community needs. The coordination eliminates duplication of efforts, and provides the maximum benefit from existing programs and services. Community participation allows residents to invest in their community by being involved in the decision-making process.

Weed and Seed has expanded considerably since its inception, and, currently, more than 300 Weed and Seed sites are operating nationwide. These sites vary in size from several neighborhood blocks to several square miles, and populations in the target area range from several hundred to over one hundred thousand residents (Community Capacity Development Office, 2005). The Community Capacity Development Office (CCDO), a program office within

the Office of the Assistant Attorney General, Office of Justice Programs, U.S. Department of Justice, administers and oversees the Weed and Seed strategies.

A prospective Weed and Seed site applies for Official Recognition of its strategy by submitting a proposal to the CCDO through the local United States Attorney's Office (USAO). The strategy must be developed locally and requires a significant amount of commitment by the community. The planning stages include organizing a Steering Committee, selecting the designated area, conducting a community assessment, selecting strategies to address challenges, identifying goals and objectives, and developing an implementation plan. Communities that develop a Weed and Seed strategy in coordination with the USAO may then submit an application for official recognition. After receiving official recognition status, sites are preferred for receiving discretionary resources from federal agencies, federally-sponsored training, and technical assistance. In addition, sites are able to use the official Weed and Seed logo and are eligible to apply for Department of Justice Weed and Seed funds.

The United States Attorney's Office (USAO) provides oversight of the Weed and Seed strategy and must work closely with officials and members of the community to accomplish Weed and Seed goals. The USAO coordinates the strategy locally, convenes a core group of community officials into a working committee, assists the local site in selecting and convening a Steering Committee, and initiates the planning activities. The USAO also coordinates federal, state, and local law enforcement efforts so sites can use federal law enforcement partners in weeding strategies and mobilize seeding resources from various federal agencies.

The CCDO provides grant management, technical assistance, and training to the sites. Additionally, CCDO disseminates funds to local sites to support their Weed and Seed strategies. However, these funds are limited and do not provide the entire amount of resources required to revitalize a high-crime neighborhood. Weed and Seed sites are required to leverage all available resources in their communities to fund their strategies. These resources may be from federal, state and local agencies, foundations, corporations, and/or other funding organizations.

The Steering Committee provides oversight and leadership for the Weed and Seed strategy. Responsibilities of the Steering Committee include facilitating the collaboration of the stakeholders, developing a strategic plan and initial development, mobilizing new and existing resources to implement goals and objectives, providing oversight of goals and objectives, establishing and tracking accountability measures, and approving and documenting changes to the strategy.

Evaluation of Weed and Seed Activities

The federal government has a strong interest in results. Weed and Seed sites are required to document performance as part of the Government Performance and Results Act of 1993 (GPRA). GPRA, in essence, requires agencies to focus on results. GPRA requires programs to document their missions, their goals and objectives for achieving those missions, and how they will measure their performance. Each year, Weed and Seed sites submit a report that documents the number of homicides that have been committed in the target area, as well as the number of drug crimes. The sites also report these data for the larger jurisdiction as a whole.

The Department of Justice also funded a national process evaluation (see Roehl et al., 1996) and a national outcome evaluation (see Dunworth and Mills, 1999). Evaluation results were mixed. Using a pre-post design, Dunworth and Mills found that Part I crimes (homicide, rape,

robbery, aggravated assault, burglary, larceny, and auto theft) declined in six sites (out of nine) after Weed and Seed was implemented. However, three target areas experienced increases in Part I crimes. When target areas were compared to their larger jurisdictions, seven target areas (out of nine) evidenced a greater decline in Part I crimes than in the rest of the city or county. The evaluation also examined resident perceptions of public safety in eight sites. Again the findings were mixed. Two sites exhibited substantial evidence of changes in perceptions across multiple outcome measures, three sites exhibited some evidence of change on some measures, and three sites exhibited little evidence of change.

In addition to the national process and outcome evaluation, the Justice Research and Statistics Association recently conducted a review of 34 local evaluation reports spanning 24 states. Overall, the evaluations generally found improvements in a number of outcomes measured. The types of outcome measures varied dramatically, as did the activities implemented. These differences limited the comparability of the reports (JRSA, 2004). Furthermore, our review of the evaluation summaries suggested that all local evaluation reports that examined police records for changes in crime utilized either pre-post designs, or comparisons to the jurisdiction as a whole. We could not find evidence of the use of more rigorous research designs, such as quasi-experimental designs. However, given the limited resources that sites have for evaluation, this result is not surprising.

Weed and Seed in Miami, Florida

Miami received Official Recognition status for the Liberty City Weed and Seed site in October 1996 and federal funding began in 1997. In 1998 Weed and Seed in Miami incorporated and became a 501(c)3 nonprofit community-based organization known as Miami/Miami-Dade Weed and Seed, Inc. The name acknowledges jurisdiction to both the City of Miami and Miami-Dade County. As the four-year term of federal funding drew to a close, Miami-Dade Weed and Seed applied in February 2000 to expand their Weed and Site to include the Little Haiti neighborhood. The Little Haiti Weed and Seed site received Official Recognition status in October 2001. Today, Miami's Weed and Seed target area includes both Liberty City and Little Haiti. The target areas for Miami/Miami-Dade Weed and Seed are shown in Figure 1.¹

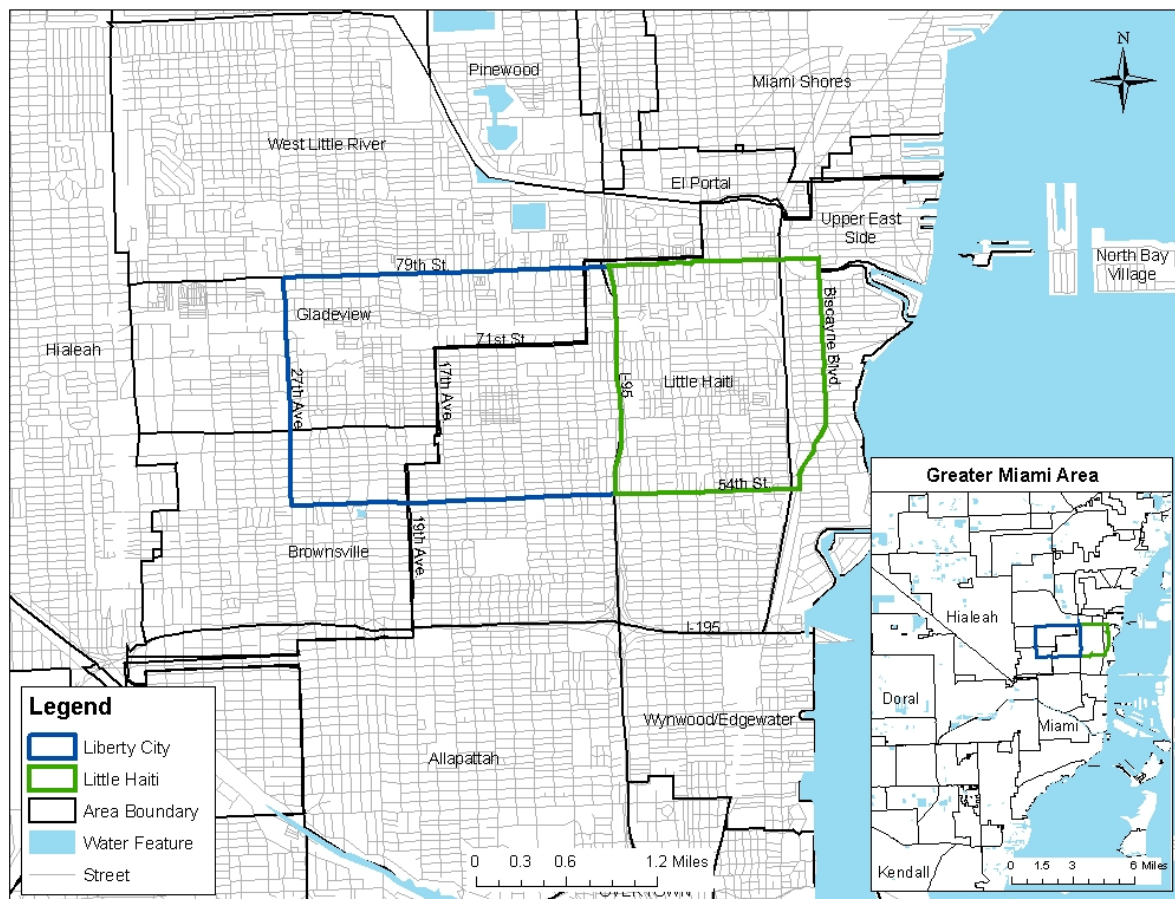
Miami/Miami-Dade Weed and Seed, Inc. also manages the federal initiative known as Project Safe Neighborhoods (PSN), a gun reduction partnership that is operating in over 90 sites nationwide. PSN efforts in Miami are focused on the Weed and Seed target neighborhoods as a way to leverage resources and build on the strong partnerships that have been established through Weed and Seed. In 2004, Miami/Miami-Dade Weed and Seed, Inc. began planning for a new program known as Operation Save our Streets (SOS). SOS focuses on crime prevention through social development. The program, designed to counter gang membership, provides a vehicle for law enforcement and social service agencies to work together on all aspects of gang issues, including education, prevention, intervention, and suppression.

In the early years of the Miami/Miami-Dade Weed and Seed initiative, activities were heavily focused on police enforcement in hot spots areas in and around the Scott/Carver housing development. Another hotspot of crime was the dividing line between the City and County jurisdictions, a zigzag line through the Miami/Miami-Dade Weed and Seed target area that

¹ The target area referenced in this study is the original target area as described by the Miami Weed and Seed site application in 1995. Since that time, the target area has been expanded roughly 15 blocks south, north and west.

follows parts of NW 7th Ave, NW 71st St., NW 17th Ave., NW 58th St., and NW 19th Ave. Law enforcement officers report that, before the Weed and Seed initiative, drug sales and prostitution were rampant along the boundary line within Liberty City (17th Avenue), with dealers scurrying across the boundary to the city side when Dade officers drove by, and over to the county side when City officers drove by. There was little coordination between the City of Miami Police Department and Miami-Dade Police Department. Through Weed and Seed activities, a strong partnership emerged—for a number of years, officers from both police departments would share patrol duties by riding together. By 1999, the Weed and Seed initiative incorporated many complementary seeding activities, and today, these activities include leadership and job fairs and workshops, school-based drug use prevention, lead awareness campaigns, and neighborhood beautification.

Figure 1. Liberty City and Little Haiti Weed and Seed Target Areas



Liberty City and Little Haiti Neighborhoods

According to official Weed and Seed reports, poverty levels are high in the two Weed and Seed sites. In the 1960s and 1970s, crime rates began increasing and by the end of 1996, many people were concerned about growing gang activity. Since that time, gangs and gang violence escalated, with an increase in rival gangs and gang-related shootings in Liberty City in the late 1990s. Weed and Seed partners and official documents before 2000 indicate a high level of drug-

related problems in Liberty City, including street level drug markets in both Weed and Seed sites. Focus groups with drug court participants in Miami found that participants named Liberty City and Little Haiti as areas where residents should not live (Goldkamp, White and Robinson, 2002). Liberty City gained national notoriety in 1996 when tourists from Holland, leaving the Miami airport in a rental car, became lost and stopped at a Liberty City gas station to ask directions. One of the occupants of the car was shot and killed in a robbery attempt.

There are many public health issues in both sites, with high rates of teen pregnancies and single parent homes. Lead has been identified as a serious environmental threat in Liberty City and Little Haiti. The high school dropout rate and the unemployment rate are reported to be high. Many residents rely on public assistance. Weed and Seed staff persons report a lack of recreational opportunities for youth.

Spatial Displacement Research

Research Findings

The literature on displacement of crime as the result of an intervention or crackdown is limited, and those studies that have considered displacement have shown mixed results. Essentially, there is no clear or consistent finding in the literature regarding the likelihood that displacement will occur or what would be the expected magnitude of any displacement that did occur. In fact, Braga's (2001) review of studies on hot spot policing paid particular attention to those studies that considered displacement; the review found only one of five studies that looked for displacement actually concluded that displacement had occurred.

Within the past decade, however, several studies have cautiously reported finding displacement. Barclay and colleagues (1996) studied motor vehicle theft in suburban Vancouver, Canada. The authors used time series analysis to study displacement subsequent to a police bike patrol program, and considered displacement of crime to areas non-contiguous to the target area but well known for motor vehicle theft. They concluded that displacement did occur to one of the displacement areas they considered. Braga et al.'s (1999) study of problem oriented policing in Jersey City, New Jersey employed a randomized controlled experimental design to compare treatment and non-treatment areas. Using Poisson regression analysis, they determined that for most crimes, displacement had not occurred, but that for property crimes in particular, a significant amount of displacement had occurred. They interpret their findings cautiously, but provide evidence that displacement varied with type of crime. Fritsch and colleagues' (1999) study of a yearlong focused police enforcement in Dallas, Texas compared crime frequencies in target and comparison areas using t-tests. They concluded that no displacement had occurred to comparison areas as a result of the police efforts.

Some studies have found that instead of displacement, a diffusion of benefits from the intervention actually occurs in neighboring areas. Green et al. (2000) studied a civil remedy program in Oakland, CA to compare the difference between traditional police handling of problem properties and an alternative method employing civil remedies. They considered displacement within a 500-foot radius of each targeted property and found that while civil remedies appeared to reduce problems in the area—diffusing benefits to nearby areas—traditional policing actually created more problems in nearby areas—displacing of problems. Smith's (2001) study of Richmond's Blitz to Bloom initiative, which involved a crackdown and

cleanup of a targeted area, also found a diffusion of benefits in two of three displacement areas considered.

Methodological Issues

Displacement of crime is most often studied by choosing an area to which crime will most likely be displaced and comparing levels of crime in that area with the target area (area where the intervention took place). The most common displacement area used is the buffer zone, or an area surrounding the target area. The buffer zone can be concentric, reaching a set distance in all directions from the target area, or it can be contiguous to the target area but extending only in limited directions (Hamilton-Smith 2002). Braga's (2001) review of hot spot policing evaluations detailed five studies that considered displacement, and all five evaluations looked for immediate spatial displacement (in areas contiguous to the target area). The size of the zone varies in the literature as well, often measured in blocks, feet, or police beats. Bowers and Johnson (2003) suggest that there is a "displacement gradient" that describes displacement as decreasing with increasing distance from the target area.

Issues with choosing a buffer zone include choosing one that is not so small as to emphasize fluctuations in the data (too small a sample of crime events) or that would not capture a fair amount of displacement that could be taking place. Conversely, it is also problematic to choose a buffer zone that is too large and "washes out" the displacement that is taking place because displacement trends are masked by larger crime trends in the area. The geographic features of an area should be taken into account in choosing a zone as well, as there may be a physical feature (e.g., a railroad, a river) that might prevent displacement from taking place in that direction. Bowers and Johnson (2003) also suggest that multiple displacement zones, increasing in distance from the target area, be employed instead of attempting to determine one appropriate displacement zone prior to analysis.

Alternatively, displacement can be measured without using a buffer zone. Ratcliffe (2005) details a methodology that employs no buffer zone, identifying no displacement area prior to studying displacement. His flexible methodology allows the researcher to study changing crime patterns across an entire study area and identify whether the changes are the result of displacement given the researcher's knowledge of interventions that took place in the study area.

Temporal Lag of Displacement

There are two temporal issues related to the study of displacement. The first is determining how soon after the start of a crackdown displacement will occur. It is expected that displacement of crime will lag behind the introduction of a crackdown to some extent. However, the lag period has not been well addressed in the literature, with prior research employing a variety of different lag periods, ranging from analyzing displacement from the start of the crackdown (no lag period) (Smith 2001) to analyzing displacement starting at the end of a problem-oriented policing strategy of indeterminate length (it ended when problems were thought to be resolved) (Braga et al., 1999).

The second temporal issue related to displacement is determining the duration of displacement. Again, this issue is not comprehensively addressed in the displacement literature, with researchers employing a variety of post-crackdown lengths in their analyses, ranging from analyzing displacement only during the crackdown (no residual displacement expected) (Smith, 1999; Ratcliffe 2005) to analyzing displacement up to 20 months after a crackdown (Bowers and

Johnson 2003). Bowers and Johnson (2003) suggest that small time periods of analysis are more subject to random fluctuations in crime, making accurate results difficult to obtain. They therefore recommend that a substantially long period of time before and after a crackdown be used to study displacement and state that the length of crackdown and expected length of residual deterrence will both play a role in determining how long after the crackdown displacement will be evidenced.

Crime in and Around Public Housing

Over the past several decades, victimization surveys and police crime data have documented a high fear of crime among public housing residents, and have shown that violent offending rates tend to be higher in neighborhoods with public housing developments compared with similar areas without public housing. Early studies (Brill Associates, 1977; Newman and Franck, 1980) revealed higher rates of victimization among public housing residents than other residents living in the same city. Recent studies provide similar findings, especially for very serious and violent offenses. DeFrances and Smith (1998) found residents in public housing reported more serious victimization, and a HUD study (2000) reveals that firearm-related victimizations among public housing residents are more than double those among the general population.

Studies using police data support findings of high violence and crime rates in and around public housing areas (e.g. Roncek et al., 1981). Pyle (1976) suggested that areas with public housing tend to bring in a substantial number of offenders from surrounding areas, while more recent research by Fagan and Davies (2000) found that violent crime tends to be associated with public housing units. The authors, examining a variety of crime categories (rape, robbery, assault, murder, and lethal violence) in and around public housing development in the Bronx, found that the proportion of total offenses is even greater in areas within 100 yards of the projects than in the public housing developments themselves. They also found that the rate of crime in public housing predicted crime rates in the census tract for rape, robbery, and murder, suggesting that crime diffuses outward. Additionally, assault and lethal violent crime in the census tract predicted crime *within* the public housing units, leading the author to conclude that crime also diffused inward as criminals seek out public housing areas for offending.

Dunworth and Saiger (1994) found higher rates for drug arrests and violent crime in areas with public housing compared to similar neighborhoods. This relationship between public housing and crime is supported by further evidence that the environment of many public housing complexes attracts drug trafficking and violence (Fosburg et al., 1996; Popkin et al., 2002).

Other researchers have studied the involvement of public housing residents in crime and violence, with a number of studies focusing on adolescents living in public housing. For instance, Sullivan (1989) reported crime among public housing residents tended to be more serious and often involved personal and drug crimes as compared to reported crime among residents not living in public housing. Popkin and colleagues (2000) studied criminal activity and youth involvement in three public housing developments. The authors described the daily life for residents living in these high-rise developments as being characterized by high levels of crime, violence, and disorder. Recent research by Ireland et al. (2003) found further evidence that living in public housing is related to participation in violence. The authors report both the prevalence and frequency of self-reported violent offending is greater among public housing residents than those not living in public housing. They also suggest that the negative effects of

living in these high-crime developments are reflected in the rising incidence of violent crimes as youth enter late adolescence.

Although the studies above all analyze crime in and around public housing, few studies have focused on assessing the impact of grand-scale changes to public housing environments. Of the few studies we could locate only one examines changes in crime after relocation due to redevelopment (Jones, no date). The author examined the impact on calls for service after the Charlotte Court housing development (Lexington, Kentucky) was demolished and roughly 600 residents were relocated. Results showed that all crime types examined decreased around the development. To examine diffusion of benefits from the target area, two buffer zones were identified around the development. The first zone encompassed a half-mile radius around the Charlotte Court area, and the second zone encompassed a one-mile radius around the Charlotte Court area. The author found that crime decreased in both zones after residents were relocated, and concluded closing the development resulted in a diffusion of benefits from the area of the development outward. Although the study findings supported the author's hypothesis, the study is limited in that it neither controls for the influence of other variables on crime, nor utilizes a comparison area, making it difficult to conclude whether the findings reflect changes due to the closing of Charlotte Court.

The Current Study

As stated in the introduction, the focus of this report is on examining the impact on crime of two interventions in the Liberty City neighborhood in Miami, Florida:

- In January 1999, Weed and Seed partners arrested 26 individuals in a gang-related crackdown. These individuals were incarcerated after their arrest. Many of them were sentenced to life in prison.
- In September 2001, the first phase of relocation of residents from Scott/Carver Homes began. Over two hundred residents were relocated in this first phase.

The Gang Crackdown in Liberty City

A key focus of Weed and Seed enforcement efforts in the early years involved the dismantling of two gangs based in Liberty City: Cloud Nine and the John Doe gang. A partnership of law enforcement agencies, including, the Miami Police Department (MPD), Miami-Dade Police Department (MDPD), Drug Enforcement Administration (DEA), and the Bureau of Alcohol, Tobacco and Firearms and Explosives (ATF) were working as part of a Safe Streets Task Force, in conjunction with the Weed and Seed Initiative. On January 7, 1999 the Safe Streets Task Force executed 26 arrest warrants and successfully apprehended 21 individuals. The arrests—based on indictments for violations of federal drug, money laundering and firearms laws—concluded an 18-month investigation targeting members of the two gangs. The two gangs controlled the majority of the distribution of cocaine, crack, heroin, and marijuana in the northwest corridor of Dade County. Members of the John Doe gang were also notorious for utilizing assault rifles to commit homicides. The Safe Streets Task Force reports that since 1995, over 40 slayings and 10 shootings have been attributed to the two gangs, including over 20 homicides and shootings since August 1998 (FBI, 2001). Table 1 shows the number of homicides recorded in Liberty City between 1995 and 1998. Arrested in the operation was the notorious leader of the John Doe gang, Corey Smith. These efforts culminated in the convictions of 38 gang members.

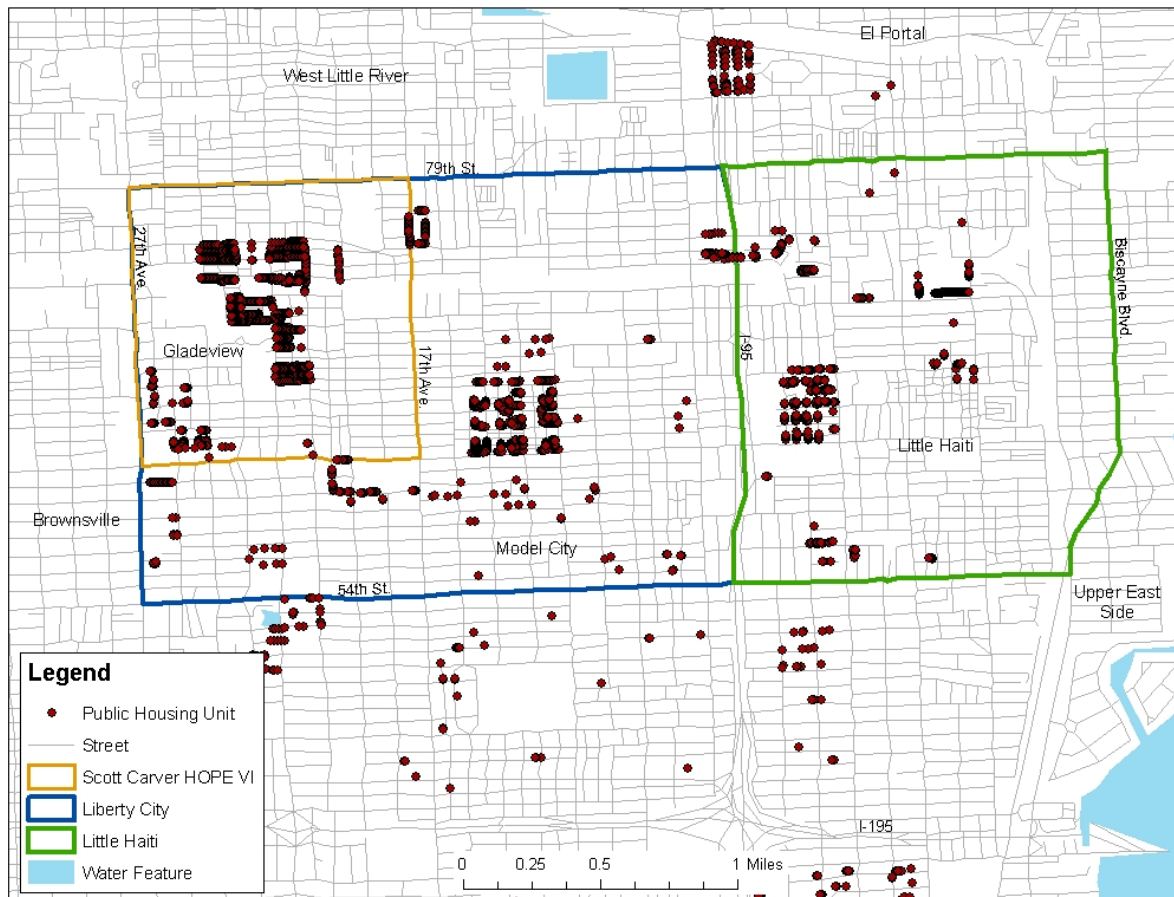
Table 1. Homicides by Year, Liberty City, (Miami, Florida), 1995 to 1998			
1995	1996	1997	1998
11	15	16	6

The Closing of Scott/Carver Homes Public Housing Development

James E. Scott Homes Housing Development (Scott Homes) and Carver Homes compose the Scott/Carver Homes in the Liberty City neighborhood in Miami (Figure 2). The barracks-style housing spanned 50 acres and housed approximately 3,500 residents in the area of NW 22nd Avenue between 62nd and 79th Streets. Scott/Carver Homes was the largest public housing development in the state of Florida. Built in 1954, Scott Homes consisted of 754 units in two-story buildings. The smaller Carver Homes was comprised of 96 units. Scott/Carver had one of the highest concentrations of children in the state (Florida Department of Education, 2005). Thirty-four percent of the residents were under 18 years of age. The median age of residents was 22. Almost half of the adult residents were high-school dropouts, and half of those over the age of 16 were not in the labor force. Half of the youth in the development lived in poverty. The housing complex was known as a haven for drug dealers and gang violence even though Scott Homes had a police substation on site. A description found in a U.S. Government Accounting Office (GAO) report portrays the disordered nature of the development:

Crime in the development and its surrounding community gives Scott Homes a bad reputation that makes it difficult to attract residents, especially working families. Vandals steal copper pipes and security windows from vacant units, shoot out lights, and steal street signs. Physical deterioration of the housing is evident in rotting door frames, water pipes that break and leak into units, and appliances that have outlived their usefulness (GAO, 1998:13).

Figure 2. Scott/Carver Homes Public Housing Development, Miami, Florida



In 2001, the Miami-Dade Housing Agency (MDHA) was awarded a HOPE VI grant of \$35 million for the revitalization of Scott/Carver Homes. The redevelopment will bring 411 new townhouse and single-family units to the site (MDHA, 2005). As HOPE VI was designed to reduce the concentration of poverty, the development reduces the density by 52 percent. Relocation of residents began in September 2001 and occurred through moves by “Sector,” of which there are four. The MDHA reports that 70 percent of households have opted for Section 8 vouchers; most of the remaining 30 percent moved to other public housing. To date, only two percent of former residents own homes (Miami Workers Center, 2005). As Sectors were relocated, the housing was left vacant and boarded up. Demolition, also by Sector, did not begin until December 2003.

Section Three. Methodology

Hypotheses To Be Tested

The study tests five main hypotheses; the first three are related to the gang crackdown and the remaining two focus on the impact of closing the Scott/Carver Homes public housing development.

The John Doe and Cloud Nine Gang Crackdown

- H1: The arrest of 21 gang members in 1999 resulted in reduction of drug activity and violence in later years in the Weed and Seed area (Liberty City).
- H2: The arrest of 21 gang members in 1999 resulted in the displacement of drug activity and violence outside the Weed and Seed area. In other words, drug activity and violence increased after January 1999 in neighborhoods directly outside of, and adjacent to, Liberty City.
- H3: Drug activity and violence remained high in the displacement area after January 1999, while drug activity and violence in a “control area” exhibited similar crime patterns both before and after January 1999.

Scott/Carver Homes Closing

- H4: The phased closing of Scott/Carver Homes resulted in a reduction of violent crime and drug activity after the end of the first phase of moves (roughly December 2001).
- H5: After December 2001, violent crime and drug incidents displaced to other public housing areas in Miami-Dade County.

The Data

The Urban Institute obtained crime reports data from the Miami-Dade County (FL) Police Department for 1995 through 2002 and from the City of Miami Police Department for July 1999 through December 2003. The two data files included approximately 2.6 million records. Urban Institute staff coded the incidents using the offense categories and definitions established for the National Incident-Based Reporting System (NIBRS) (Criminal Justice Information Services Division, 2000). Records pertaining to non-criminal events (e.g., recovered property, informational interviews) and traffic violations were removed, leaving 1,219,269 Miami-Dade County records and 110,555 City of Miami records. These records were geocoded so that the incident locations could be mapped. The geocoding process was successful for 96.4 percent of the City of Miami records and for 90.7 percent of the Miami-Dade County records. Both of these geocoding match rates exceed the minimum match rate convention of 85 percent commonly used in crime analysis.

The Miami-Dade County Police Department divides south Florida, including the city of Miami, into approximately 3,000 grid areas. The Miami-Dade County incident records included a variable identifying the grid in which the incident occurred. The City of Miami data did not include a grid variable. Therefore, Urban Institute staff created one after the data were geocoded by spatially matching incidents to the County grid map.

A victim weight variable was also created. For crimes against persons (i.e., murder, manslaughter, forcible sex offenses, assault, and kidnapping) the weight was set equal to the number of recorded victims. For all other types of criminal offenses, the weight was set equal to

one (1). Urban Institute staff applied the weight variable as a frequency weight in all analyses. The weight was applied to conform with the counting rule used by the Uniform Crime Reporting system, which counts one crime per victim for incidents involving offenses against persons and one crime per incident for all other types of offenses (Federal Bureau of Investigation, 2004).

The analysis described below utilizes two general categories of crimes: (1) violent offenses (i.e., murder and non-negligent manslaughter, forcible rape, robbery, and aggravated assault), and (2) drug offenses (i.e., drug violations and drug equipment violations). Drug offenses are those offenses that involved drugs of any kind.

Data Limitations

One limitation to this study is the use of official police data (incident records) as a measure of crime. The amount of bias present from using only official police data is unknown. However, research has shown that results produced using official records are roughly consistent with results using victimization data (Bastian, 1993; Blumstein, Cohen, and Rosenfeld, 1991).

Another limitation is that the data are collected from two different police departments. Although we utilized NIBRS categories to aggregate incidents into uniformly defined categories, it is possible that the incidents are recorded differently in the two jurisdictions, introducing some bias into the measurement. Furthermore, the City of Miami data set begins in mid-1999; the Miami-Dade County data set begins in 1995, making it difficult to simultaneously examine crime patterns and displacement in the mid-1990s for the entire Miami area.

Analytical Approach

The analysis has two central components: (1) interrupted time series analysis to examine the impact of crime after the gang crackdown, and (2) tests for spatial displacement using the Bowers and Johnson (2003) Weighted Displacement Quotient. The 1999 gang crackdown provides a unique opportunity to test for spatial displacement using both methods. To date, few studies examining displacement have utilized an interrupted time series design because time series crime data covering a long period of time (preferably a period of six years or more) are needed to conduct the analysis. Bowers and Johnson (2003) developed their method to assist displacement research where lengthy time series pre- and post-intervention are not available. Because data are available for this study to utilize a time series design, we undertake both types of analysis as described in more detail below. Our review of the literature found no studies that compared results based on the two methods.

Because this study is a place-based study focusing on crime patterns in and around the Liberty City neighborhood, it is important to develop a focused target area to test for spatial movement. Below, we first discuss the method for choosing the target, buffer, and control areas.

Identification of Target, Buffer, and Control Areas for Gang Crackdown

The boundaries of the Liberty City Weed and Seed area, the buffer, and comparison area are all based on Miami-Dade County Police Department grid boundaries. The gang crackdown took place in Liberty City, and thus, the chosen *target area* for the portion of the study focusing on the gang crackdown is the section of Liberty City located in the county (as mentioned earlier, data prior to July 1999 were not available from the city). We designated the *buffer area* (i.e., displacement area) for the crackdown to be the larger Liberty City/Model City area, directly contiguous with the original Liberty City Weed and Seed boundaries. The *control area* (i.e., the

area we hypothesize will show no change in crime pattern) includes only the grids contiguous to the buffer area and in the county. Figure 3 shows the target, buffer and control area used in the analysis of the gang crackdown. The target area is smaller than the buffer area or control area. The control area and buffer area are approximately the same size.

Identification of Target, Buffer, and Control Areas for Scott/Carver Development

Different target, buffer, and control areas were defined for the second part of the analysis, focusing on the Scott/Carver Homes shutdown. To examine spatial displacement of crime due to the relocation of public housing residents, we employ a buffer zone non-contiguous to the public housing area. Our anecdotal knowledge of the relocation areas of former Scott-Carver residents indicates that many residents moved in clusters, to other public housing locations. If this were indeed the case, we would want to examine whether crime shifted to the new resident locations as well. Grids for this part of the analysis are in both the city and county. Here, the *target area* is defined as the area targeted for redevelopment as part of the HOPE VI project. The *buffer area* is defined as all grids with more than 100 public housing units and within six miles of the center of the target area. This selection process resulted in a buffer zone comprised of grids both non-contiguous to each other and non-contiguous to the target area. The *control area* includes all grids within a half-mile of every grid in the buffer area. This results in a large number of grids, but better captures the varied characteristics of the widespread buffer area than would a smaller control area. Figure 4 displays the target, buffer and control area used in the analysis of the public housing relocation.

Figure 3. Selected Target, Buffer, and Control Areas for Analysis of Gang Crackdown

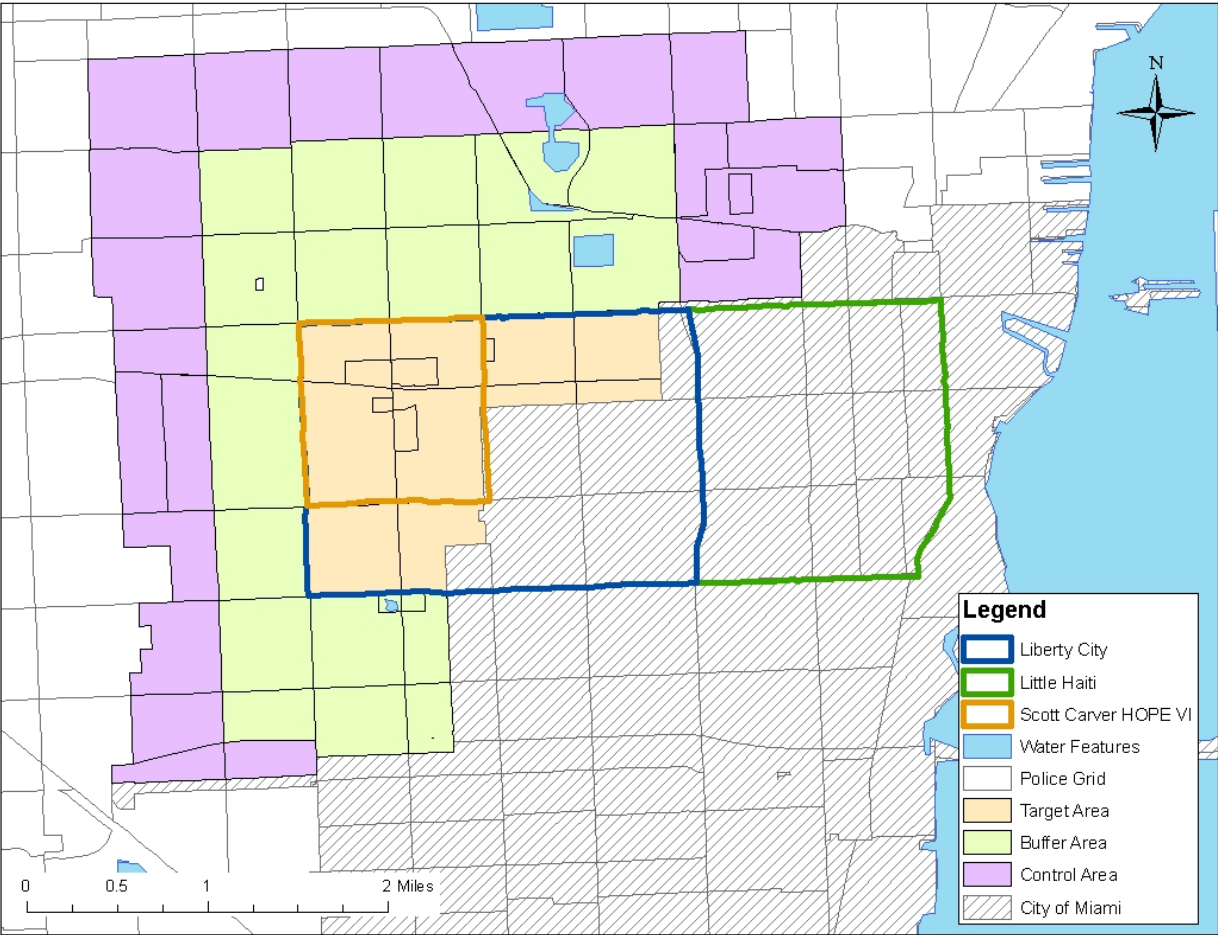
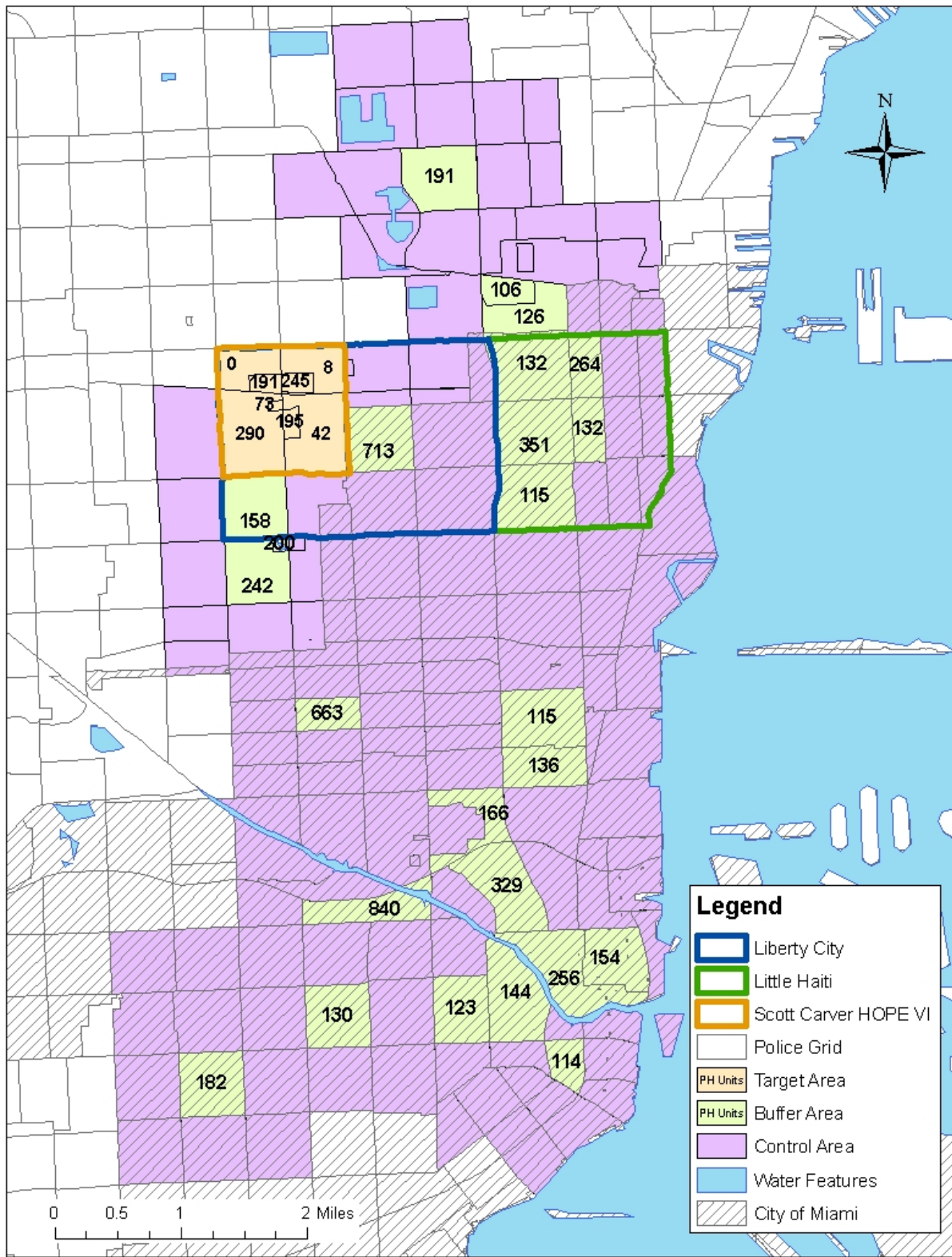


Figure 4. Selected Target, Buffer, and Control Areas for Analysis of Public Housing Relocation



Time Series Analysis

Urban Institute staff used an interrupted time series quasi-experiment to assess the impact of the 1999 gang crackdown on violence and drug activity in Liberty City (Hypothesis 1). The impact of crime is also modeled in a displacement area (buffer area) (Hypothesis 2), in addition to a control area (Hypothesis 3). Time series analysis could not be used to model the change in crime levels resulting from the Scott/Carver shutdown because the period of data available that covered the target, buffer, and control areas was too short (1999-2002). In addition, unlike the short and distinct gang crackdown, the Scott/Carver shutdown was a gradual process over an extended period of time; modeling such an intervention using time series methods is difficult and may lead to inaccurate results.

In an interrupted time series design, an outcome is observed at equally spaced intervals of time during a span in which some change in the underlying process generating the outcome is hypothesized to occur. The series of observations is examined to see if the hypothesized shift in the underlying process is observable as a shift in the observations. The observations from the period of time prior to the hypothesized change or intervention are treated as a baseline against which the post-intervention observations are compared.

Urban Institute staff used the processed Miami-Dade County Police data to prepare six time series for analysis. Only the Miami-Dade County data were used because no Miami City data were available for the period prior to the January 1999 crackdown.

For each of the three areas—Liberty City, buffer zone, and control area—two time series were prepared. One time series was composed of monthly counts of violent crime (i.e., murder and non-negligent manslaughter, forcible rape, aggravated assault, and robbery) from January 1995 through December 2002. The other time series was composed of monthly counts of drug crime (including both drug and drug equipment violations) over the same time span. The time series model, in its simplest form, can be diagrammed as:

O _{A1}	O _{A2}	O _{A3}	O _{A4}	O _{A5}	X	O _{A6}	O _{A7}	O _{A8}	O _{A9}	O _{A10}
O _{B1}	O _{B2}	O _{B3}	O _{B4}	O _{B5}		O _{B6}	O _{B7}	O _{B8}	O _{B9}	O _{B10}
O _{C1}	O _{C2}	O _{C3}	O _{C4}	O _{C5}		O _{C6}	O _{C7}	O _{C8}	O _{C9}	O _{C10}

where A is the outcome variable: crime (violent and drug crime) within the target area (Liberty City). B and C represent crimes in the buffer area and control area, respectively.

The common threat to the external validity of an interrupted time series design is the possibility that a change other than the hypothesized intervention affected the observed series at the same time that the hypothesized intervention occurred. The effects of the two interventions would then be conflated in the impact estimates. To guard against this type of inferential error, it is common to examine time series data from the same span of time but from an area that was unaffected by the intervention of interest (in this case, the crackdown in Liberty City) and would have been affected by any other unspecified or unidentified change that might have affected the treatment area (in this case, Liberty City). If a shift is observed in the time series from the

treatment area but not in the control area time series, the fact pattern bolsters the discriminate validity of the inference attributing the shift in the time series from the treatment area to the hypothesized intervention. The time series from the comparison area were analyzed to provide discriminant evidence in support of any inference that the Liberty City crackdown had an effect.

Conventional linear models are inappropriate for use with time series data. Such models, such as ordinary least squares regression, assume that the data being modeled are independent observations. Time series data, by contrast, are serially dependent with each observation being a realization of the same underlying process. Applying OLS to such data will typically yield autocorrelated residuals and inaccurate parameter estimates.

A more appropriate analytic technique with time series data is to estimate an autoregressive integrated moving average (ARIMA) model to the time series that yields residuals that are “white noise” (i.e., independently and normally distributed with a mean of zero and constant variance). The process of fitting the ARIMA model is known as “pre-whitening.” After the series is pre-whitened, a transfer function² is used to estimate the impact of the intervention on the pre-whitened dependent series. The resulting model is subjected to diagnostic tests to determine if the model is adequate. If the model is not adequate, a new model is estimated until a statistically adequate model is found.

The U.S. Census Bureau models time series data in this fashion as a matter of routine and developed its X-12-ARIMA software for this type of analysis (U.S. Census Bureau, 2004). The software is freely available on the Internet and includes built-in capability to adjust the time series for variability in the length of months, leap year effects, and other types of common seasonal variation. The X-12 software also includes a routine that examines the model residuals for outliers that may exert disproportionate effect on the parameter estimates.

Several forms of transfer functions were considered for this study. They include:

- A step function which supposed an abrupt and permanent shift in the number of incidents for the entirety of the post-intervention period (i.e., from January 1999 through December 2002).
- A pulse function, which supposed that the effect of the intervention would only be observed in January 1999.
- A three-month step function, which supposed that the series would shift to a new level beginning in January 1999, maintain that new level through March 1999, and return to its pre-intervention level thereafter.
- A six-month step function, which supposed that the series would shift to a new level beginning in January 1999, maintain that new level through June 1999, and return to its pre-intervention level thereafter.
- A three-month decay function, which supposed that the series would shift to a new level in January 1999 and gradually (in a linear fashion) return to its pre-intervention level by April 1999.
- A six-month decay function, which supposed that the series would shift to a new level in January 1999 and gradually (in a linear fashion) return to its pre-intervention level by July 1999.

² Transfer functions incorporate new information via input series to augment what is already provided in a single variable time series equation. In the ARIMA models tested here, the transfer functions represent the “intervention.”

We hypothesized that any impact of the gang crackdown on violent crime would be an abrupt, but temporary, shift. We also hypothesized that there would be a significant, but short-lived spike in drug incidents during the crackdown, followed by a significant decrease in drug activity to levels below pre-1999 levels. Regardless, we estimated models with each of the six transfer functions and used the *F*-corrected Akaike Information Criterion to determine which transfer function provided the best fit, regardless of whether the parameter estimate associated with the transfer function was statistically significant.³

Tests for Spatial Displacement

Although the ARIMA models discussed above were constructed only to model the effects of the gang crackdown, tests for spatial displacement were conducted for both the gang crackdown and the relocation of Scott/Carver residents. As stated earlier, we did not have the data (i.e., a lengthy time series post intervention) to appropriately model the Scott/Carver relocation efforts using an interrupted time series design. However, the method chosen for examining spatial displacement, described below, incorporates a “success measure” that provides the opportunity to examine the change in crime levels subsequent to the relocation of residents (Hypothesis 4).

To measure displacement, the weighted displacement quotient (WDQ), developed by Bowers and Johnson (2003) is used. The WDQ involves three areas – a target (A), buffer (B), and comparison (C) area. The formula is provided in Equation 1.

$$WDQ = \frac{\frac{B_{t1}}{C_{t1}} - \frac{B_{t0}}{C_{t0}}}{\frac{A_{t1}}{C_{t1}} - \frac{A_{t0}}{C_{t0}}} \quad (1)$$

The quotient has two parts: the *buffer displacement measure*, which measures the change in crime in the buffer area relative to the change in crime in the control area over the same period, and the *success measure*, which measure the success of an intervention—the reduction (or slowed increase) of crime in the target area. The buffer displacement measure is divided by the success measure to calculate the final WDQ. The two parts of the WDQ will be considered independently before calculating the final WDQ to determine the change in levels of crime in the Scott/Carver target and buffer areas.

The WDQ can be used to measure the relative size of diffusion of benefits or displacement (not absolute size), and significance testing can also be conducted with the WDQ. Positive values of the WDQ indicate a diffusion of benefits; values less than one indicate diffusion, or a positive effect on crime levels in the buffer area, that is less than the direct effect of the intervention in the target area. Positive values that are close or equal to one indicate diffusion that is about equal to the direct effects of the intervention in the target area, while values greater than one indicate that the positive effects on crime levels were greater in the buffer area than in the target area. Negative values of the WDQ indicate a displacement of crime; values greater than zero and less than one indicate that displacement did occur, but that the negative effect in the buffer area was less than the positive effect of the intervention in the target area. Values greater than one indicate that displacement occurred, and also that the negative effects in the buffer area were actually

³ Given the large number of series examined, the resulting statistics for these tests are not included here.

greater than the positive effects in the target area. This method can be employed with point or aggregate data, with the most accurate results obtained from point data, because point data allow the development of target, buffer, and control areas that do not follow administrative boundaries. For this analysis, aggregate data at the grid level are used. Grids are sufficiently small enough, and generally equal in size, that they should not create a significantly different result than if point data were used to develop target, buffer, and control areas. Furthermore, we rely on grid data because all incident records in Miami-Dade County have an associated grid number, overcoming any potential bias introduced from not having 100 percent of the point data geocoded (9 percent of all County records could not be geocoded).

Although using the WDQ provides a measure of “success” of the intervention, it is important to note that the measure is not a rigorous test of whether *the intervention itself significantly contributed to any change in crime*. The WDQ can only “suggest” success and examine possible displacement. With the careful modeling of the intervention and possible lag times for displacement, ARIMA time series modeling provides a more appropriate test of the impact of the intervention and a stringent examination of whether displacement occurred. We recognize that it is very difficult to obtain time series crime data for a long period of time for a small neighborhood, and that the need for research to immediately examine effectiveness often precludes researchers from utilizing an interrupted time series design given that policy makers often want to know what works immediately or soon after the intervention.

Selection of Temporal Lag for Displacement

Gang Crackdown

Because the intervention—the gang crackdown—was based on arrests made on one day, January 7, 1999, the pre and post periods exclude that date. Therefore, all formulas utilize pre-intervention periods that end on January 6, 1999 and post-intervention periods that start on January 8, 1999. Hence, we are hypothesizing that there is no lag for displacement.

Scott/Carver Relocation

While discussions with staff at MDHA indicated that each phase of the resident relocation took approximately a year, because of data restrictions and the inability to determine when most residents moved during the year, the Urban Institute decided to narrow the focus to the first four months of the first phase of resident move-out, which began in September 2001. We hypothesized that effects would be felt as soon as residents began to move out. The first phase of relocation involved 220 residents. Hence, we assume a “lag” of four months; displacement effects are examined for the period after January 1, 2002.

Selection of Duration Period for Displacement

Gang Crackdown

As Bowers and Johnson (2003) suggest, we chose to examine a number of models that vary the duration of displacement. This provided us several observations from which to draw conclusions on the displacement lag. The WDQ was calculated for three different time period lengths pre- and post-intervention—12 months, 24 months, and 36 months—to determine whether displacement can be identified at different periods.

Scott/Carver Relocation

The WDQ was calculated to determine whether displacement occurred following the first four months (September-December 2001) of resident move-out from the Scott/Carver public housing development. Data covering the target, buffer, and control areas were only available from the beginning of 1999 to the end of 2002, providing limited time periods of sufficient length for testing crime levels before and after the time period of interest. The time periods chosen for the analysis excluded the four-month move-out period from the analysis, with the pre-move-out period lasting one year, from September 1, 2000 to August 31, 2001 and the post-move-out period lasting January 1, 2002 to December 31, 2002. This provides the most pure pre-move-out period.

Section Four. Findings

This section summarizes the results of the inferential analysis beginning with the time series analysis examining the 1999 gang crackdown and continuing into the examination of spatial displacement of crime connected with the closing of the Scott/Carver Homes public housing complex.

Time Series Analysis

A total of six time series were examined to estimate the effect of the 1999 gang crackdown on violent and drug crime in each of three areas. The modeling of each time series is discussed briefly in turn. Parameter estimates from the final models are summarized in Table 2.

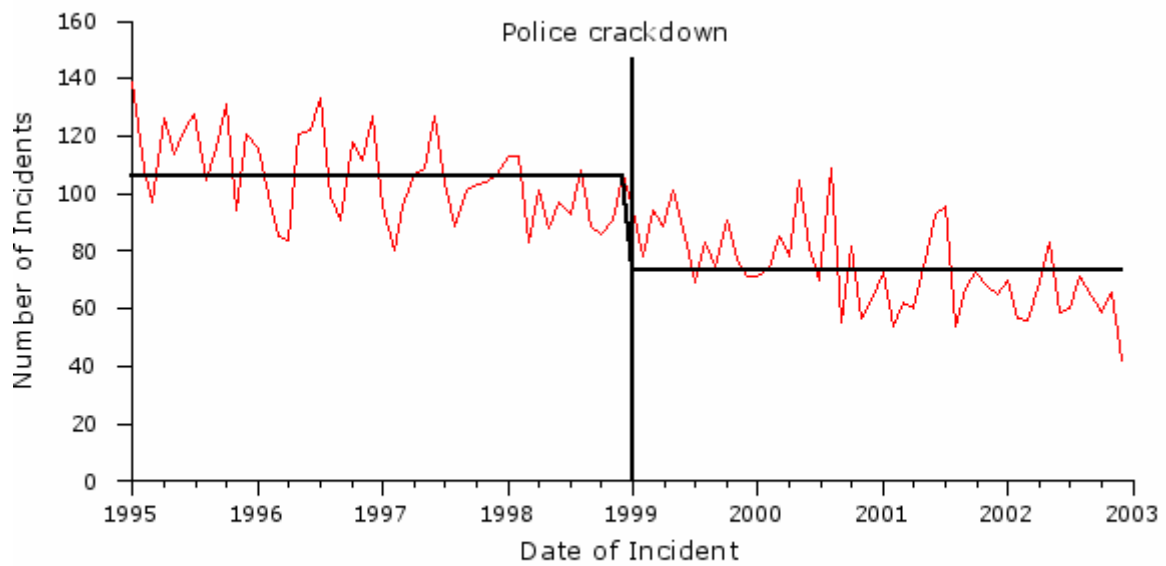
Violent Crime in Liberty City

This time series was adjusted for length of month and log-transformed to reduce its variance. The transformed time series was then differenced on lag 1 to remove its trend and differenced again on lag 12 to remove its seasonal trend. Statistically significant moving average parameters were estimated on lags 1, 12, and 14, and an additional parameter was added to control for the August 2000 observation, which was identified as an outlier. These steps were sufficient to pre-whiten the time series. None of the six transfer functions was statistically significant, which is inconsistent with hypothesis 1 (gang crackdown resulted in reduction in violent crime in Liberty City). The step function provided the best fit. The original, untransformed time series is shown in Figure 5.

Violent Crime in Buffer Area

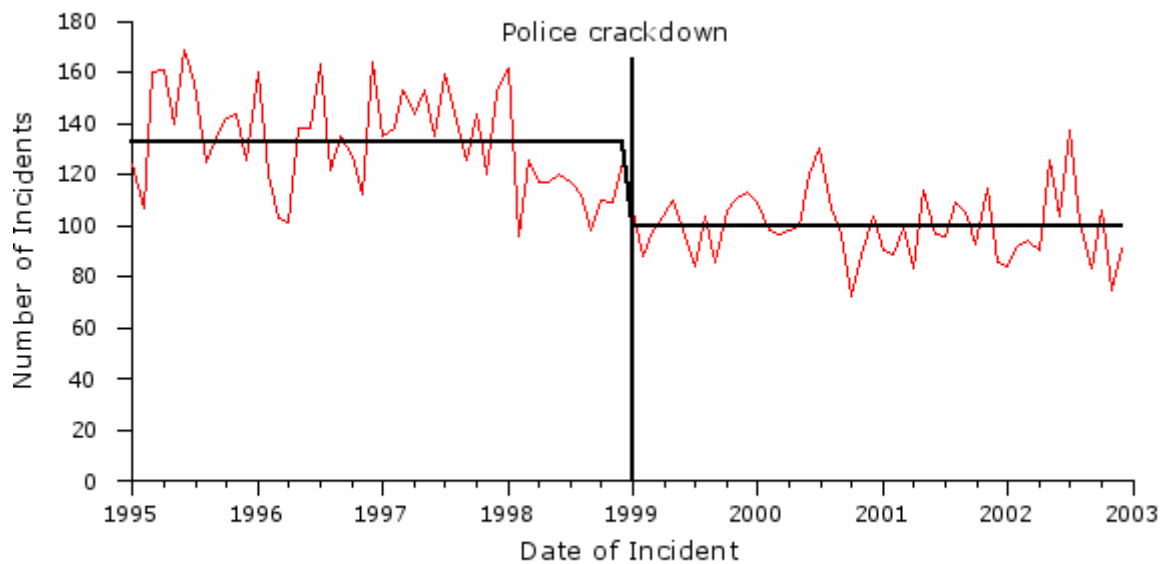
This time series was adjusted for length of month and log-transformed to reduce its variance. The transformed time series was then differenced on lag 1 to remove its non-seasonal trend, and eleven parameters were added to adjust for month-specific seasonal fixed effects. Statistically significant autoregression parameters were estimated on lags 1, 2, 4, and 15. A statistically significant moving average parameter was estimated on lag 5. Three parameters were added to control for outlier observations from April 1996, July 1997, and October 2000. An additional parameter was included to control for a shift in level from the beginning of the series through February 1998. These steps were sufficient to pre-whiten the time series. Of the six transfer functions, only the step function was statistically significant and its effect was to reduce the level of the series from its pre-intervention level. This finding is inconsistent with hypothesis 2 (gang crackdown will cause displacement). Figure 6 shows the original, untransformed time series.

Figure 5. Violent Crime in Liberty City, Jan. 1995 - Dec. 2002



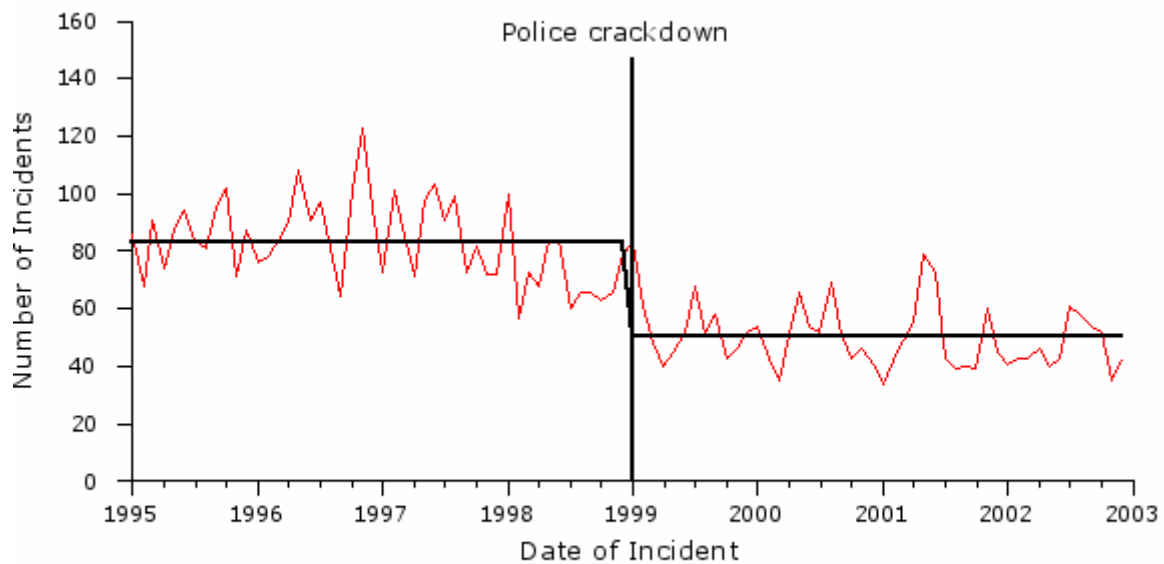
Source: Data provided by the Miami-Dade County Police Department.

Figure 6. Violent Crime in Buffer Area, Jan. 1995 - Dec. 2002



Source: Data provided by the Miami-Dade County Police Department.

Figure 7. Violent Crime in Control Area, Jan. 1995 - Dec. 2002



Source: Data provided by the Miami-Dade County Police Department.

Violent Crime in Control Area

This time series was adjusted for length of month and log-transformed to reduce its variance. The transformed time series was then differenced on lag 1 to remove its non-seasonal trend. Statistically significant autoregression parameters were estimated on lags 1 and 2, and statistically significant moving average parameters were estimated on lags 3 and 4. These steps were sufficient to pre-whiten the time series. Of the six transfer functions, only the step function was statistically significant. The finding of a significant downward shift in violent crime in the control series is inconsistent with hypothesis 3 (no change to the control series). The original, untransformed time series is shown in Figure 7.

Drug Crime in Liberty City

This time series was adjusted for length of month and log-transformed to reduce its variance. The transformed time series was then differenced on lag 1 to remove its trend and differenced again on lag 12 to remove its seasonal trend. Statistically significant autoregression parameters were estimated on lags 1, 2, 12, and 15. A statistically significant moving average parameter was estimated on lag 4, and an additional parameter was added to control for the October 1995 observation, which was identified as an outlier. Six additional parameters were included to control for significant trading day effects (i.e., the fact that months vary with respect to the number of each day of the week—Sunday, Monday, . . . , Saturday—they include). These steps were sufficient to pre-whiten the time series. Parameter estimates associated with each of the six transfer functions were significantly greater than 1 after exponentiating to reverse the log transformation of the series. The value of the parameter suggests that the intervention shifted the level of the series upward, which is inconsistent with hypothesis 1 (gang crackdown resulted in

decreased in drug crime) . The 3-month decay function provided the best fit. The original, untransformed time series is shown in Figure 8.

Table 2. Intervention Estimates for Effect of the Crackdown on Violence and Drug-Related Incidents

Time Series	Best Fitting Transfer Function	Intervention Parameter	95% CI	
			Lower Bound	Upper Bound
Monthly violent crime incidents				
Liberty City Weed and Seed area	Step	0.92	0.84	1.01
Buffer area	Step	0.88*	0.78	0.98
Control area	Step	0.72*	0.60	0.86
Monthly drug-related incidents				
Liberty City Weed and Seed area	3-month decay	2.21*	1.53	3.19
Buffer area	Step	1.66	0.98	2.82
Control area	Pulse	1.31	0.70	2.46

* Statistically significant ($P < 0.05$).

Note: Parameters are estimates of multiplicative effects such that parameter values greater than 0 but less than 1 imply an effect that reduces the level of the time series, parameter values equal to 1 imply no effect on the series, and parameter values greater than 1 imply that the level of the series is increased by the effect.

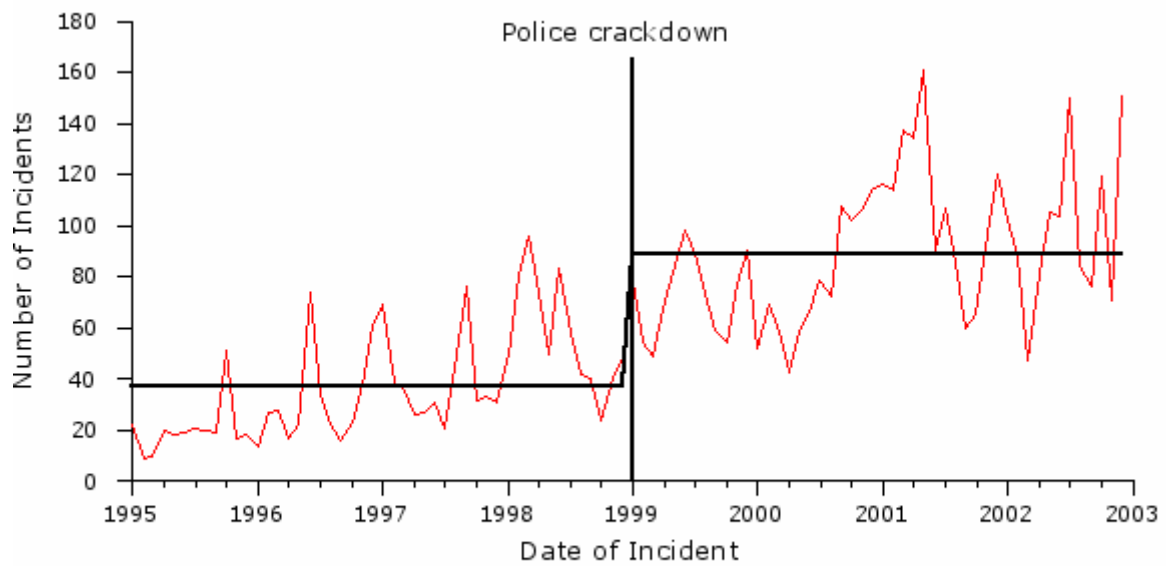
Drug Crime in Buffer Area

This time series was adjusted for length of month and log-transformed to reduce its variance. The transformed time series was then differenced on lag 1 to remove its non-seasonal trend. One statistically significant moving average parameter was estimated on lag 1. These steps were sufficient to pre-whiten the time series. None of the six transfer functions was statistically significant, which is inconsistent with hypothesis 2. The original, untransformed time series is shown in Figure 9.

Drug Crime in Control Area

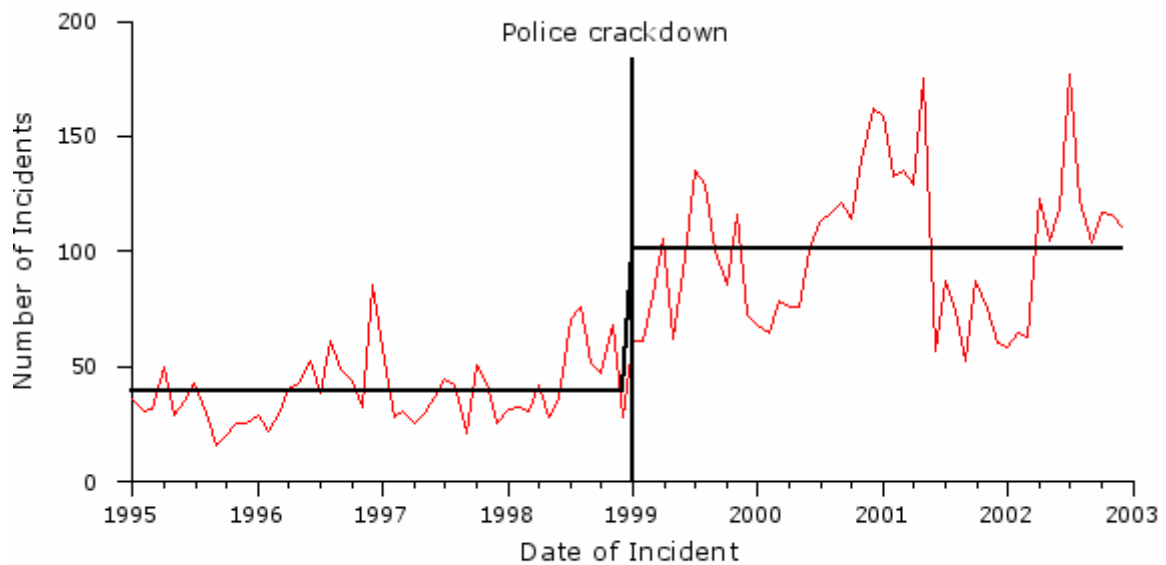
This time series was adjusted for length of month and log-transformed to reduce its variance. The transformed time series was then differenced on lag 1 to remove its non-seasonal trend and differenced again on lag 12 to remove its seasonal trend. A statistically significant autoregression parameter was estimated on lag 4, and statistically significant moving average parameters were estimated on lags 1 and 12. Six additional parameters were estimated to control for trading day effects. These steps were sufficient to pre-whiten the time series. None of the six transfer functions was statistically significant, which is consistent with hypothesis 3. The original, untransformed time series is shown in Figure 10.

Figure 8. Drug Crime in Liberty City, Jan. 1995 - Dec. 2002



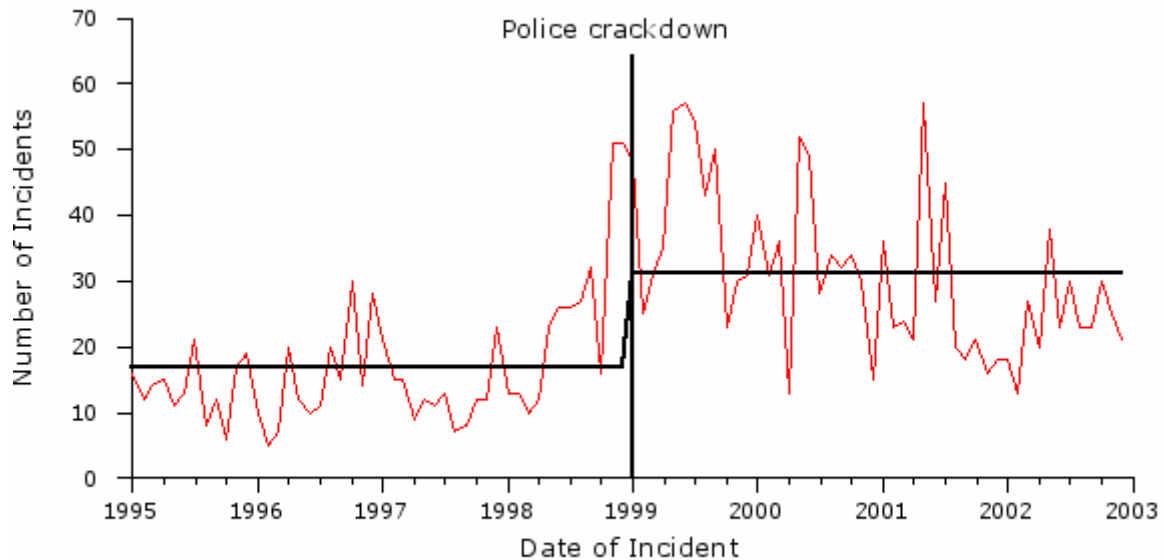
Source: Data provided by the Miami-Dade County Police Department.

Figure 9. Drug Crime in Buffer Area, Jan. 1995 - Dec. 2002



Source: Data provided by the Miami-Dade County Police Department.

Figure 10. Drug Crime in Control Area, Jan. 1995 - Dec. 2002



Source: Data provided by the Miami-Dade County Police Department.

Spatial Displacement Analysis

This section describes the results of the Bowers and Johnson weighted displacement quotient analysis for both of the interventions, the gang crackdown and the Scott/Carver shutdown.

Gang Crackdown

To measure displacement following the gang crackdown in January 1999, the WDQ was calculated, using the target, buffer, and control areas outlined above. (The data are drawn only from the county, and potential displacement can thus only be measured in the direction away from the city.) Table 3 provides the WDQ for each time period, 12, 24, and 36 months pre- and post-intervention.

Table 3: WDQs for Violent and Drug crime at 12, 24, and 36 Month Pre and Post Periods, Gang Crackdown			
	12 months	24 months	36 months
Violent Crime	0.45	0.44	0.45
Drug Crime	0.39	0.41	0.36

The table reveals that the WDQs for drug and violent crime using three different pre and post-intervention lengths do not vary greatly. All of the WDQs are positive, indicating that benefits diffused from the target site to the buffer area. The values below one, however, indicate that the positive effects felt in the buffer area were not as large as the positive effects felt in the target area. Also, the similarity among values for the different pre and post intervention lengths indicate that any diffusion benefits that occurred were most likely captured in the first period, with only

very small changes in crime rates with the inclusion of the longer time periods. However, it could be that changes occurred at a shorter time period after the intervention, such as within three or six months, and that the longer time periods for analysis may be masking what is occurring in the areas of interest.

Scott/Carver Relocation

Before testing for displacement, an exploration of the crime levels before and after the Scott/Carver resident relocation was necessary. This was not accomplished with the time series analysis, as was done for the gang crackdown, because of lack of sufficient data to perform that type of analysis. Instead, a descriptive analysis of crime in the target, buffer, and control areas was performed. The results reported here are strictly descriptive; no testing was undertaken to determine whether the changes experienced were statistically significant. Crime rates for this analysis were calculated using Census 2000 data; unfortunately, no population data were available for subsequent years and the rates are thus all calculated using the same population information. Table 4 displays the crime rates for the pre- and post-relocation periods in each of the three areas used in the analysis.

Table 4: Crime Rates per 1,000 Persons by Area and Time Period, Scott/Carver Relocation

	Violent Crime		Drug Crime	
	Pre Move-out (9/1/00 to 8/31/01)	Post Move-out (1/1/02 to 12/31/02)	Pre Move-out (9/1/00 to 8/31/01)	Post Move-out (1/1/02 to 12/31/02)
Target Area	88.77	73.03	79.14	68.82
Buffer Area	9.64	8.92	8.85	8.75
Control Area	6.19	6.22	4.68	4.42

The results in Table 4 indicate that, with one exception, crime rates decreased in all three areas for both violent and drug crime from the pre to post move-out periods. The exception is that in the control area, violent crime increased very slightly from the pre to post periods. The target area saw the biggest decrease in crime rate of the three areas for both types of crime. This confirms that a search for displacement is appropriate because the reduced crime rate in the target area could be the result of crime merely moving to the buffer area.

Another way to consider the change in crime rates is to break the WDQ into its component parts, the buffer displacement measure, which is the numerator of the quotient and considers the changing crime rates in the buffer area relative to the control area, and the success measure, which is the denominator of the quotient and considers the changing crime rates in the target area relative to the control area. For violent crime, the buffer displacement measure is -0.12 . The negative value indicates crime decreased in the buffer area but only slightly. The success measure for violent crime is -2.60 indicating that crime decreased in the target area, and that the decrease was greater than in the buffer area. For drug crime, the buffer displacement measure is positive and equal to 0.09 , indicating that crime in the buffer area increased slightly relative to the control area. The success measure is negative, equal to -1.36 , indicating that crime decreased in the target area relative to the control area, and as with violent crime, the decrease was greater than that experienced in the buffer zone. Overall, the results are consistent with the claim that crime may have been displaced into the buffer zone.

Next, the WDQ was calculated for both violent and drug crimes (Table 5). The WDQ for violent crimes, measuring displacement to other public housing locations as a result of the Scott/Carver shutdown, was 0.04. This value, while positive, is very small, indicating that there were little to no net effects, whether positive (diffusion of benefits) or negative (displacement of crime) felt in the buffer area after the first four months of the Scott/Carver resident move-out. For drug crime, the WDQ was -0.06. While negative values of the WDQ do indicate displacement, the value of the WDQ in this case is so small (i.e., nearly zero) that no displacement effects can be assumed. Thus, for both violent crime and drug crime, no displacement or diffusion effects were felt subsequent to the first phase of the Scott/Carver resident move-out.

Table 5: Buffer Displacement, Success Measures, and WDQs for Violent and Drug Crimes, Scott/Carver Relocation

	Buffer Displacement Measure	Success Measure	WDQ
Violent Crime	-0.12	-2.6	0.04
Drug Crime	0.09	-1.36	-0.06

Section Five. Discussion and Conclusion

The Miami/Miami-Dade Weed and Seed initiative has focused crime prevention and intervention efforts in the Liberty City neighborhood since 1996. These efforts, still going strong in 2005, include a variety of prevention or “seeding” efforts, as well as concerted enforcement efforts to rid the neighborhood of violence and drug markets. The early years of Weed and Seed in Miami, however, were heavily devoted to ridding the neighborhood of violent gangs and working with residents to understand how best to attack crime-related problems. Around the same time, the Miami Dade Housing Agency was also attempting to improve quality of life issues in the Liberty City neighborhood, through HOPE VI redevelopment of the Scott/Carver Homes. Weed and Seed partners successfully dismantled two violent gangs in 1999, concluding a multi-year investigation that resulted in the arrest and incarceration of 38 gang members. By 2001, the first phase of relocation of residents of Scott/Carver homes began. This study examined the impact on crime of these events as well as whether spatial displacement of crime occurred as a result of the events.

The results of the interrupted time series analyses do not support the supposition that violent crime and drug activity decreased significantly as a result of the crackdown. The effect of the crackdown on violent crime was in the expected direction (a decrease in violence crime), but the parameter estimate was not significant. With regard to drug activity, the results show that drug activity significantly *increased* for a three-month period after the initial arrests of 21 gang members on January 7, 1999. Although these findings do not support our hypotheses, it is reasonable to assume that the early January crackdown resulted in sustained enforcement of drug crimes for a number of months. This enforcement activity was mostly likely part of related efforts to weed out other members of the John Doe and Cloud Nine gangs. It is possible that those arrested on January 7th gave up information on their gang associates and others involved in the gang-related drug markets. Thus, the increase in officially recorded drug incidents following

the January 1999 crackdown may be attributable to an increase in enforcement activity rather than an increase in actual drug offending.

This study also hypothesized that, given the large number of gang members arrested and incarcerated, displacement of crime to areas contiguous to Liberty City would occur. This hypothesis was not supported by the study findings. On the bright side, the time series results showed that there was evidence to conclude that some diffusion of benefits may have occurred with regard to level of violent crime in the buffer (displacement) zone. The diffusion of benefits seems to have extended beyond the buffer zone and into the control zone, as both parameter estimates are less than one and statistically significant. Some critics may observe that displacement or diffusion is not possible when impacts are not felt in the target area; we take the findings to imply that the extent of target area may have been misspecified. It is possible that the individuals arrested in the Liberty City crackdown lived outside the target area (and in the buffer zone), and perhaps were responsible for violent crimes in those neighborhoods. The impact of arrest and incarceration of individuals living in the buffer zone would most likely impact crime in areas close by their homes.

Additionally, although the time series analysis did not find a significant reduction in violent crime or drug crime in the target area, examination of crime patterns using the Bowers and Johnson (2003) WDQ method found that there was some evidence of a reduction in violent crime and drug incidents after the gang crackdown within the target area and also in the displacement area. These findings, particularly those for drug incidents, contrast with the time series findings. The WDQ analysis showed that, on average, there was a reduction in violence and drug activity in the periods examined following the crackdown, compared to the same periods pre-crackdown. As stated earlier, the WDQ is not a statistical measure that can attribute any causal meaning to the results. In other words, the WDQ answers the question of relative change in areas studied (i.e., target, buffer, control), as opposed to the cause of changes in the areas studied. Future research should continue to analyze displacement using these multiple methods. Analysis using the WDQ can help guide models tested and transfer functions chosen, when using an interrupted time series design. Similarly, results from interrupted time series designs can assist the choice of lags and duration when using the WDQ.

With regard to the relocation of Liberty City residents due to the closing of Scott/Carver Homes, the displacement analysis using the WDQ found that there was a decrease in both violent crime and drug crime in the target area (Scott/Carver Homes) relative to the levels of crime in a control area. These findings support our hypothesis that the outflow of residents would lead to a reduction in crime (hypothesis 4). However, findings regarding our displacement hypothesis (hypothesis 5) were not supported. The results showed that any diffusion of benefits (violent crime) or displacement of crime (drug crime) found in the displacement area was too small to conclude that possible changes in crime occurred.

Study Limitations

There are a few limitations to our study that we hope to overcome with future analyses and better data. First, the study did not control for other variables that could have caused or meaningfully influenced the interventions studied. These variables include other enforcement initiatives, the employment rate, and population changes in Liberty City. Although citywide estimates exist, attempts to gather (or construct) these annual data for the target areas were not successful.

Second, we are somewhat limited from constructing representative displacement areas for which to examine the effects of the relocation of Scott/Carver public housing residents. Discussions with MDHA staff persons indicated that at least 30 percent of relocated residents moved to other public housing. Given research that shows that public housing developments often serve as attractors or generators of crime, and local police officials stipulated that crime in other public housing developments was increasing due to the Scott/Carver closing, we limited our displacement area to those grids that contained more than 100 units of public housing. It is possible that displacement occurred to those grids that contained Section 8 housing, where the majority of Scott/Carver residents moved. However, we were unable to locate or obtain data that provided the locations of Section 8 properties. Related to this, we tested the assumption that displacement would occur to non-contiguous neighborhoods (i.e., grids). These neighborhoods may be outside the displacement gradient. In other words, although offenders or potential offenders might be moving to other neighborhoods, they may continue to commit crimes in areas they are most familiar—these areas, if not within the target area, would be in close proximity to the treatment area (Bowers and Johnson, 2003; Eck, 1993).

Third, the study was an attempt to examine Weed and Seed-related interventions within the Liberty City neighborhood. Our chosen target area for the gang crackdown was defined by the administrative boundaries that corresponded to the Weed and Seed neighborhood boundaries that existed in 1999. As mentioned above, given that a gang crackdown may target some offenders who live *outside* the target neighborhood but commit (at least some of) their crimes in the defined Liberty City target area, it may be more appropriate to construct a target area that mirrors the hotspots of gun and drug crime pre-1999. Our time series findings of possible diffusion of benefits in the Liberty City buffer area with regard to violence crime suggest the need for additional analyses examining a larger target area. Presumably, the Liberty City target area was chosen as a Weed and Seed site for that reason, but it is possible that additional hotspots existed that were contiguous to the Weed and Seed target area. There is some basis to this claim given that Weed and Seed leaders later (post 1998) expanded the target area's western, northern and southern boundaries. Future displacement research studies that have access to incident-level crime data could explore the possibility that different target areas may elicit different results.

Conclusion

The study of spatial displacement offers an important complement to studies examining the effectiveness of crime prevention activities. Crime prevention partnerships are often focused expressly on reducing crime within a specified neighborhood, with little attention to the impact felt by surrounding neighborhoods. As found in this study using the WDQ to examine changes of crime with regard to the gang crackdown, diffusion of benefits outward from the target neighborhood is a plausible consequence of targeted gang and drug reduction activities. Examining the effectiveness of crime prevention activities with an eye toward displacement and diffusion will assist efforts to better understand the phenomena and minimize any unintended, negative consequences. To date, the displacement literature is limited and the findings are mixed. The limited body of literature hinders the development and testing of hypotheses that is necessary to advance research in this the field. Ultimately, sound research will influence methods of prevention.

Furthermore, as stated earlier, we found no studies comparing the utility of the relatively new Bowers and Johnson Weighted Displacement Quotient method to well-established interrupted

time series designs. It is our belief that time series analysis represents the more rigorous approach, and should be utilized whenever possible. The WDQ can be used to assist model development and explore the myriad of possible changes in crime due to interventions.

Weed and Seed efforts around the country have been successful in leveraging federal, state and local resources to mobilize against crime. It is imperative that researchers and local practitioners keep track of these efforts and when possible, examine their effectiveness. The myriad of partners, activities, and numerous leveraged dollars in longstanding Weed and Seed initiatives often make it difficult to ascertain the exact nature of the intervention and the appropriate outcomes. Nevertheless, given the large number of Weed and Seed initiatives operating around the country, the time is here to take a closer look at the initiatives' impacts. Technological improvements and methodological advances, coupled with the increased availability of usable crime data, has made it possible to examine what works in crime prevention with some rigor.

These advancements in technology, methods, and data availability will facilitate the examination of the multiple forms of displacement. Access to address-level crime and arrest data containing person identifiers (e.g., name, social security number, etc.) make it possible to examine perpetrator replacement and crime type (functional displacement). Spatial data on targets (e.g., types of victims, physical objects, or places), coupled with arrest data, provide a unique opportunity to examine target redirection. These rarely studied phenomena are undeniably critical to understanding and reducing offending.

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