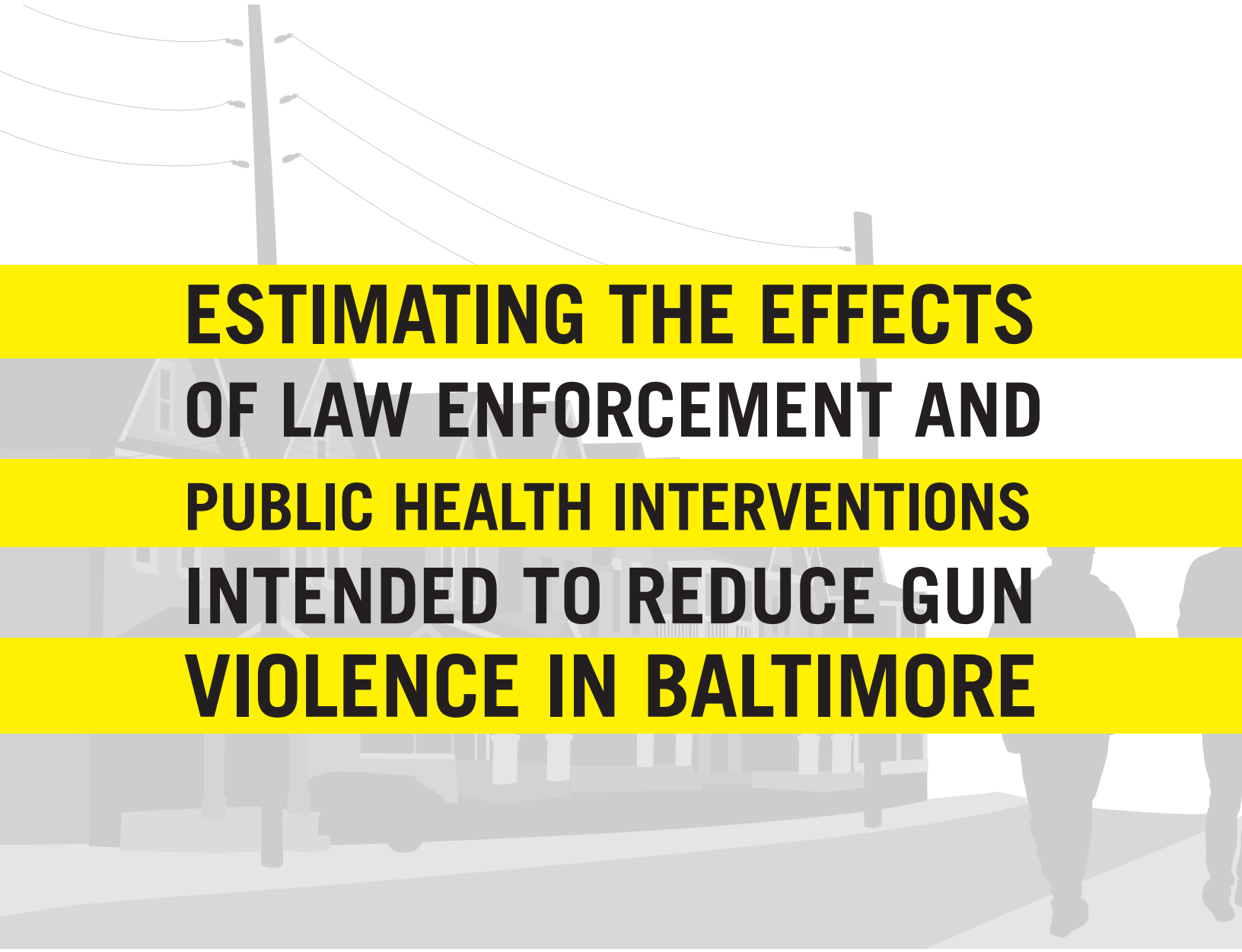

ESTIMATING THE EFFECTS OF LAW ENFORCEMENT AND PUBLIC HEALTH INTERVENTIONS INTENDED TO REDUCE GUN VIOLENCE IN BALTIMORE

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January 11, 2018

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Background

Baltimore has long been plagued by high rates of homicides, with guns playing an important role. City and law enforcement officials in Baltimore have attributed much of the gun violence to the illegal drug economy and the availability of guns for criminal use. For many years, the most visible and direct approaches employed by the Baltimore Police Department (BPD) to curb gun violence have focused on enforcement of drug laws to reduce violent crime associated with the drug trade. In the most ambitious and resource-intensive efforts, the objective of law enforcement actions has been to "take down" or severely weaken organized groups selling illegal drugs through targeted arrests and prosecutions. Such efforts are intended to both remove violent criminals from communities and, ideally, deter violent crime. Most of these targeted drug law enforcement efforts have been place-focused, targeting "hot spots" for homicides and shootings. Within these hot spots, there is often some degree of targeting of individuals believed to be important drivers of gun violence, based on intelligence gathered, individuals' histories of criminal offending, and individuals' criminal associates.

In the early 2000s, Baltimore City leadership encouraged aggressive enforcement of drug laws, resulting in the arrests of tens of thousands of individuals for drug possession and drug distribution. However, beginning mid-2007, the BPD shifted its focus to initiatives aimed at apprehending violent criminals and targeting illegal gun possession. We used data from January 1, 2003, through December 23, 2017, to estimate the effects of place-focused policing and prevention initiatives that were focused on criminal offending involving guns and/or drugs to estimate the effects of those interventions on homicides and nonfatal shootings. An overview of the specific interventions assessed in this study follows.

Hot Spot Policing focused on Gun Offenders

Detective units have been deployed to hot spots for violence to focus on individuals with a history of violence, gun offending, and/or involvement with violent gangs. These units included the Violent Crime Impact Section (VCIS) which was put in place in July 2007 with a focus on "bad guys with guns" and operated until December 2012. Prior research in other cities has documented consistent success with similar policing efforts designed to deter illegal gun possession and use.[1] The Gun Trace Task Force (GTTF) was established around the same time as VCIS, but initially with the mission of focusing on those who supply guns for criminal use. The GTTF soon shifted their primary focus to illegal gun possession cases; however, the unit did not have specific areas where they concentrated their efforts. Because our focus was on measuring temporal-spatial associations between enforcement activities and gun violence, we did not have data that would allow us to estimate any impact of the GTTF on violence. A unit with a mission similar to VCIS, the Special Enforcement Section (SES), was deployed from January 2013 to December 2014. Additionally, District Hot Spot zones for priority enforcement were established in February 2014. Our initial models found no association between SES and District Hot Spot deployment and gun violence, and those variables were dropped from the final models for parsimony. In addition to the special initiatives, we assessed the relationship between changes in the number of arrests for illegally possessing handguns within an area and subsequent homicides and nonfatal shootings in that and surrounding areas.

Focused Deterrence or Group Violence Intervention (GVI)

Focused deterrence—also known as Group Violence Intervention (GVI)—is a program designed to target key individuals and groups tied to gun violence in areas with the highest rates of gun violence with "focused deterrence" and supports for targeted individuals to turn away from violence. Developed by criminologist David Kennedy, whose team helped to advise Baltimore on its implementation of the program, *Ceasefire* involves extensive collection and analysis of data to identify the places, groups, and individuals to target the intervention. The goal is to deter violence through direct communication with targeted individuals in group meetings ("call-ins") and personal notification meetings. Police, prosecutors, and corrections officials inform those being targeted that they are being closely watched and that any act of serious violence by the individuals or their groups will result in a swift and severe response from law enforcement, including possible federal prosecution. The call-in meetings or notifications include members of the community who have been impacted by violence or who are otherwise credible and respected messengers to convey the need for the violence to stop. The program model also includes an offer of services from local agencies and community-based organizations to support behavior changes, including substance abuse treatment and assistance finding employment. Law enforcement actions taken against targeted individuals are ideally communicated to other individuals or groups to deter them from committing future acts of violence.

The program model has an impressive track record in curbing urban gun violence, yielding consistent reductions in gun violence of moderate to large magnitude.[2] In a forthcoming systematic review of evaluations of focused deterrence, 19 of 24 studies report noteworthy crime reductions with the strongest effects on urban gun violence.[3] Under the name *Ceasefire*, GVI call-ins began on June 10, 2014, with a total of three call-ins in Baltimore's Western District through November 12, 2015. There were an additional two call-ins in the Eastern District: one on March 31, 2015, and one on August 27, 2015.

Drug Law Enforcement Actions

Baltimore's problem with high rates of homicides and other violent crimes has typically been viewed as stemming from illegal drugs, the gangs that sell those drugs, and access to guns by those involved in drugs and other crime. Because a large share of perpetrators of homicides and other violent crimes are involved in selling illegal drugs, and many shootings occur in the context of illegal drug transactions, arresting drug sellers and their customers could quell violence in a community where there is an active illegal drug trade. Conversely, law enforcement actions that disrupt an illegal drug economy, which is fueled by enormous demand for the product and a livelihood for some who might otherwise have limited opportunities in the legal economy, could prompt more violence. Competitors may use violence to vie for the market that is made available due to a drug-selling ring being incarcerated or could generate violence to discourage or eliminate information sharing with law enforcement.[4,5]

Given the prominent role that drug law enforcement has played in the crime-fighting strategies used in Baltimore and many other U.S. cities, and the enormous resources involved throughout the criminal justice system, there are surprisingly few rigorous scientific studies of its impact on homicides and violent crime. What has been published provides little evidence that traditional and even some non-traditional approaches to drug law enforcement are effective in reducing violent crime. In many cases, efforts to take down drug-selling organizations result in increased violence.[6] As described in more detail below, we assessed the impact of several drug law enforcement practices, including overall volume of arrests for illegal drug possession or drug distribution, surges in drug distribution arrests in a given area during a given month, and major drug busts that often target a specific group of drug sellers.

Safe Streets

Safe Streets Baltimore is a public health program that focuses on the same type of individuals targeted by hot spots policing and focused deterrence initiatives – those at greatest risk for involvement in gun violence –, though *Safe Streets* tends to focus on high-risk youth between the age of 15 and 24 years. However, rather than use law enforcement, *Safe Streets* uses so-called credible messengers – individuals who typically have prior involvement with gangs and drugs, but who have committed themselves to helping to keep youth and their communities safe from violence. Outreach staff develop relationships with youth believed to be at highest risk for involvement in gun violence and serve as positive role models, mentors, and supports for making choices that steer young people away from using violence. Youth served by *Safe Streets* receive referrals to relevant programs or services that might help to keep them safe and minimize their involvement in activities that could lead to violence. *Safe Streets* staff attempt to promote new ways of thinking and behaving so that violence is not seen as an acceptable or useful way to handle interpersonal conflicts.

Community events sponsored by *Safe Streets* attempt to send strong and consistent messages that violence is not acceptable to influence social norms. Staff also play important roles in mediating conflicts that occur in the communities in which they work that have the potential to lead to shootings or other serious forms of violence. Staff are hired by community-based organizations that have successfully competed for contracts to implement the program overseen by Baltimore City

Health Department's (BCHD) Office of Youth Violence Prevention. BCHD assists with staff hiring, training, and adherence to the program model. The program was first implemented in McElderry Park in East Baltimore in July 2007 and has been implemented in several other neighborhoods that historically struggled with high rates of gun violence. Program funding has principally come from grants from federal (US Department of Justice and Centers for Disease Control and Prevention) and state (Governor's Office of Crime Control and Prevention) agencies, and private foundations (Weinberg Foundation, Abell Foundation), with a modest amount of funds from Baltimore City.

Prior evaluations of *Safe Streets* revealed reductions in gun violence associated with program implementation in most, but not all sites.[7,8] Specifically, the first evaluation estimated statistically significant reductions in nonfatal shootings in Cherry Hill, Madison-Eastend, and Elwood Park ranging from 34% to 44% and reductions in homicides of 26% in McElderry Park and 54% in Cherry Hill. However, homicides rose sharply during Madison-Eastend's 20-month intervention period. Surveys of youth in neighborhoods where *Safe Streets* operated demonstrated attitudes that were less supportive of using guns to resolve conflicts than was the case in similar comparison neighborhoods.[7,8]

Research Methods

Study Design

We used a multiple interrupted time-series design to estimate the effects of law enforcement and public health interventions applied in specific police post areas and specific months to estimate the interventions' effects. Each observation represents a police post *i* in month *t* over the study period January 2003 through December 2017. The analytic approach described below includes a set of independent variables, including fixed effects to control for baseline means in each post and month and year fixed effects to control for underlying unmeasured forces that affect trends in homicides and nonfatal shootings.

Data Sources

Data were obtained from the Baltimore Police Department and Open Baltimore on homicides, nonfatal shootings, and arrests for the period January 1, 2003, through December 23, 2017. BPD provided staffing logs and deployment maps for the Violent Crime Impact Section (VCIS) zones and data on the locations and times where the other hot spot policing initiatives directed at gun violence were deployed. We also examined the effects of similar units, renamed Special Enforcement Section and District Hot Spot Units. In all of our initial models, we found no evidence of impact on either homicides or nonfatal shootings from hot spot detective deployment other than VCIS and report only VCIS estimates in the final models. *Safe Streets* site locations and dates of operation were provided by BCHD. Dates and impacted areas for meetings with targeted offenders for the *Ceasefire* intervention were provided by the Mayor's Office on Criminal Justice. We explored data maintained by state and federal prosecutors and the courts to identify major drug busts and information about the timing of the law enforcement action and the location where the drug activity occurred; however, no data source could be identified that provided the necessary information other than articles in *The Baltimore Sun* and local media outlets. Details on the impacted areas for the East Baltimore redevelopment efforts were obtained from the East Baltimore Development Inc. (EBDI) website.

Measures

The outcomes of interest, homicide and nonfatal shooting incidents, were recorded and summed for each BPD post where the incident occurred by month and year during the study period, January 1, 2003, through December 23, 2017. Illegal weapon possession arrests, illegal drug possession arrests, and illegal drug distribution arrests were extracted from BPD arrest files and totaled by police post and month. The vast majority of illegal weapon possession arrests in Baltimore (over 80%) involve firearms. The illegal drug distribution arrest category includes arrests for trafficking, manufacturing, and possession with intent. One-month lagged variables were then created to estimate the effect on homicides and nonfatal shootings in month *t* of the total number of each category of drug and weapon arrests that occurred in the previous month (*t*-1). Surges in drug distribution arrests were defined as 15 or more arrests within a given post and month and coded as an indicator variable, so that 1 = drug distribution arrest "surge" and 0 = otherwise. One-, two-, three-, four-, five-, six-, nine-, and twelve-month lagged variables were created to estimate the timing and duration of any effect on homicides and shootings in time t following surges that occurred in the previous months (*t*-1, *t*-2, *t*-3, etc.).

After exploring data from Maryland and federal courts on prosecutions for illegal drug sales, we determined that the data sources commonly lacked specific information about the location of the alleged illegal activity and the number of individuals involved for purposes of this research. Instead, we extracted information from articles from *The Baltimore Sun* and other local media outlets covering arrests for illegal drug sales and indictments over a period of 14 years (2003-2016). We developed a coding instrument to create a dataset that includes information on dates of arrests and indictments, locations of alleged criminal activity, key suspect demographic information, and arrest-related information such as type of narcotic involved, gun seizures, and assets and monetary seizures. We reviewed approximately 500 news articles and recorded data on key variables from each article to identify drug busts in Baltimore City. If the place of alleged criminal activity was mentioned, that was recorded; if not, place of arrest was recorded. If both were mentioned, we used the place of criminal activity to locate the bust.

The dataset further allowed us to distinguish between 'major' and 'minor' drug busts so that we could examine how differences in the allocation of law enforcement resources, such as operations to arrest the leaders of large narcotic syndicates, influence violence in Baltimore. An arrest or indictment was categorized as a major bust if any of the following conditions were met:

1) the total number of suspects for a given event exceeded five;

2) charges included drug conspiracy, drug kingpin statute, running a violent drug gang, continuing a criminal enterprise, or RICO (Racketeer Influenced and Corrupt Organizations) Act violations; or

3) one or more suspects were facing federal charges.

We identified 69 major busts during the study period. Of the 69 major busts, 20 were excluded from our analyses because their locations could not be determined from the news articles.

Interaction variables were created to estimate any differences in the effects of drug or weapon arrests on homicides and nonfatal shootings after the 2015 unrest occurred. Lagged variables were created for the major busts to estimate their one-, two-, three-, four-, five-, six-, nine-, and twelve-month effects on the outcomes of interest. VCIS deployment zones were not bounded by post lines by BPD, so maps of the deployment zones, redrawn each year between 2007 and 2012, were superimposed onto post maps to determine which posts had a VCIS presence. An indicator variable was created so that 1 = a post with a presence, while 0 = otherwise. The *Ceasefire* intervention was measured as an indicator variable, with a 1 delineating a post within the district where a call-in occurred and 0 = otherwise. The indicator remained turned on through the end of the study period to account for enforcement actions that took place in the district after the call-in. The *Safe Streets* interventions were coded with indicator variables, with 1 = a post with a *Safe Streets* site and 0 = otherwise. The indicator was turned on during the operational periods defined by the BCHD. The effects of the East Baltimore community redevelopment were measured by creating an indicator

variable so that 1 = a post where the redevelopment efforts have been occurring and 0 = otherwise. We also created an indicator variable to measure potential extended effects of the East Baltimore redevelopment on posts adjacent to those in the redevelopment catchment area, with 1 = a post adjacent to the area where the redevelopment efforts have been occurring and 0 = otherwise. Spatial lag variables were created for the bust, arrest, VCIS, *Safe Streets*, and East Baltimore redevelopment variables to account for any potential geographic spillover effects of the enforcement actions or interventions.

An indicator variable was created to capture and control for the period following the civil unrest spurred by the in-custody death of Freddie Gray that was immediately followed by a dramatic increase in homicides and nonfatal shootings (May 4, 2015—December 23, 2017).

Analytic Strategy

A multiple interrupted time-series design was used to test for the effects of various interventions and enforcement activities on homicide and nonfatal shootings. We used negative binomial logistic regression models that included fixed effects for police post to control for baseline differences in levels of gun violence, year to control for unmeasured factors that influence yearly trends in citywide violence, and month to control for seasonal cycles in gun violence. The coefficients of the regressions were transformed into incident rate ratios (IRRs) so the results can be interpreted as percentage change in the outcome. An IRR equal to 1.00 indicates no effect and IRRs below or above 1.00 can be viewed in terms of percentage change relative to a 1.00. For example, IRR = 0.80 indicates a 20% reduction in shootings associated with an intervention and IRR = 1.20 indicates a 20% increase in shootings associated with an intervention.

14
Years of data gathering on illegal drug sales arrests and indictments

80%
Of illegal weapon possessions arrests involved firearms.

~500
News articles analyzed to find major drug busts

69
Major busts identified

49
Major drug busts were analyzed

Trends for Homicides and Nonfatal Shootings

The number of homicides (Figure 1) and shootings (Figure 2) per month declined beginning in the latter half of 2007 before leveling off in 2011 (homicides) and 2013 (nonfatal shootings). Gun violence in Baltimore City surged following the civil unrest in April 2015 and has fluctuated around new, higher norms since then.

Figure 1. Three-month moving average of homicides, 2003-2017

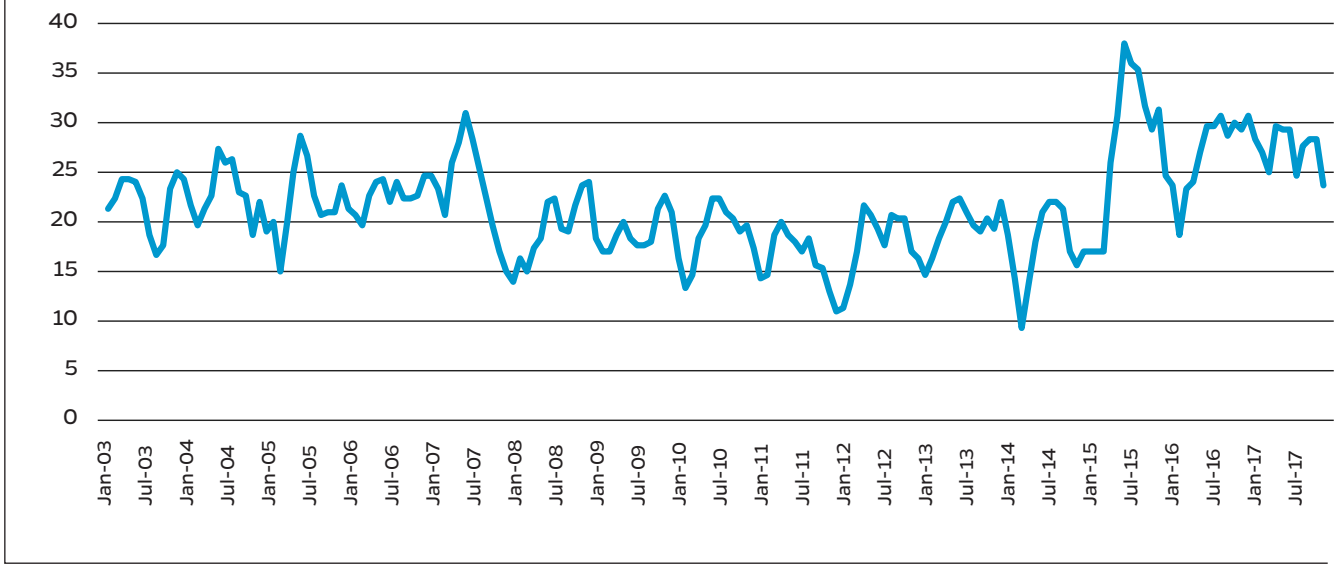
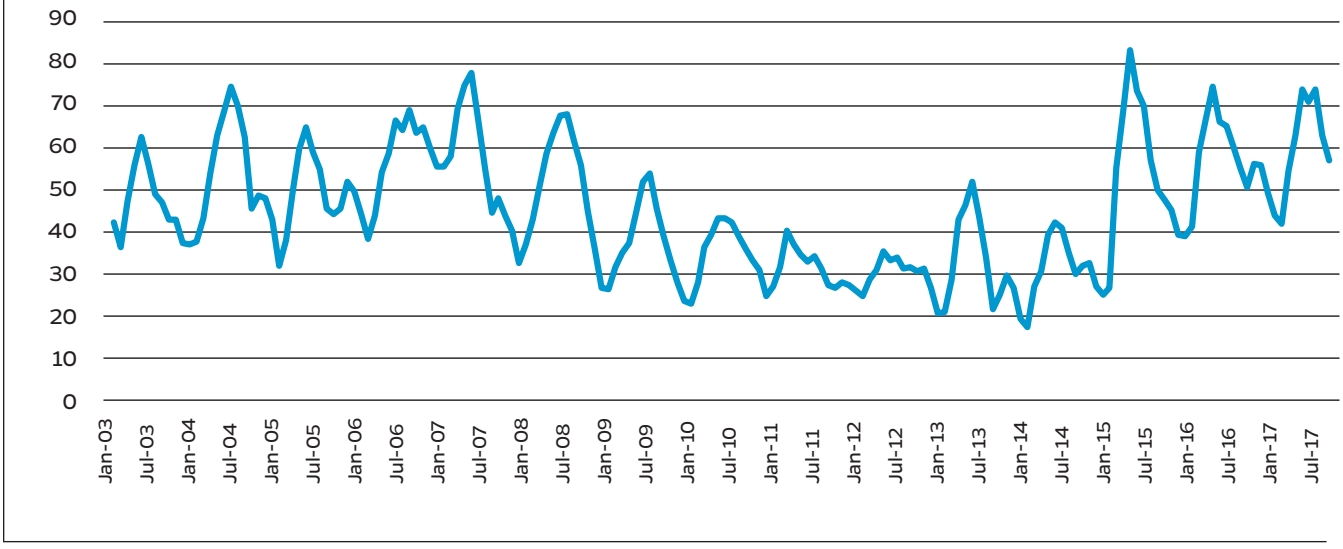


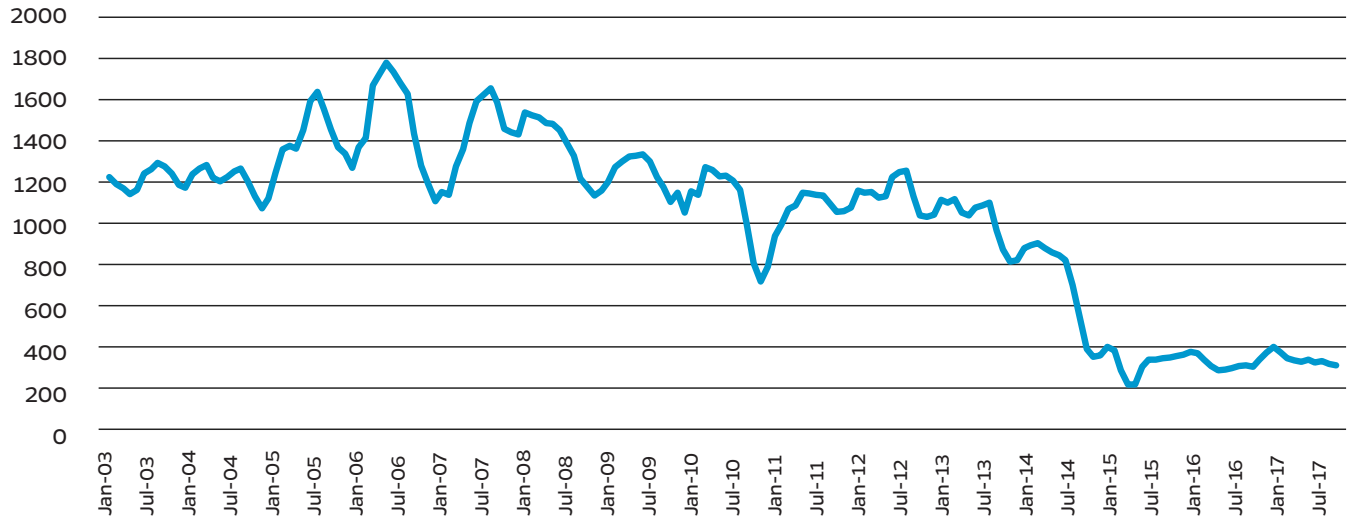
Figure 2. Three-month moving average of nonfatal shootings, 2003—2017



Law Enforcement Trends

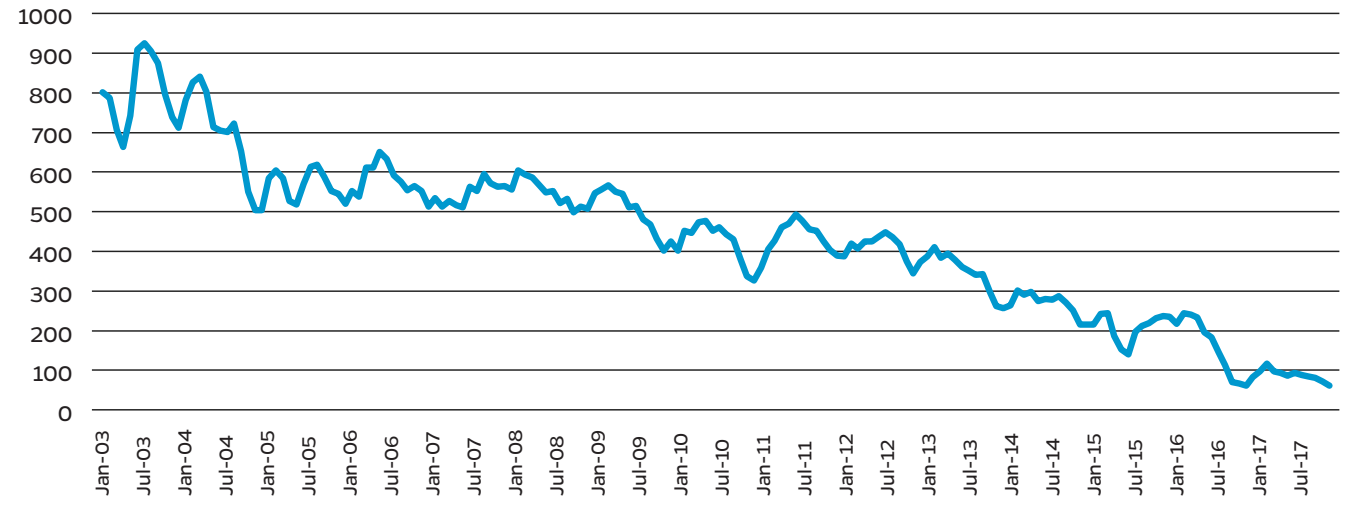
Drug-related arrests declined during the study period, including a dramatic drop-off in arrests for drug possession beginning October 2014, when Maryland decriminalized the possession of small amounts of marijuana (Figure 3). The number of drug possession arrests has leveled off since June 2015.

Figure 3. Three-month moving average of drug possession arrests, 2003-2017



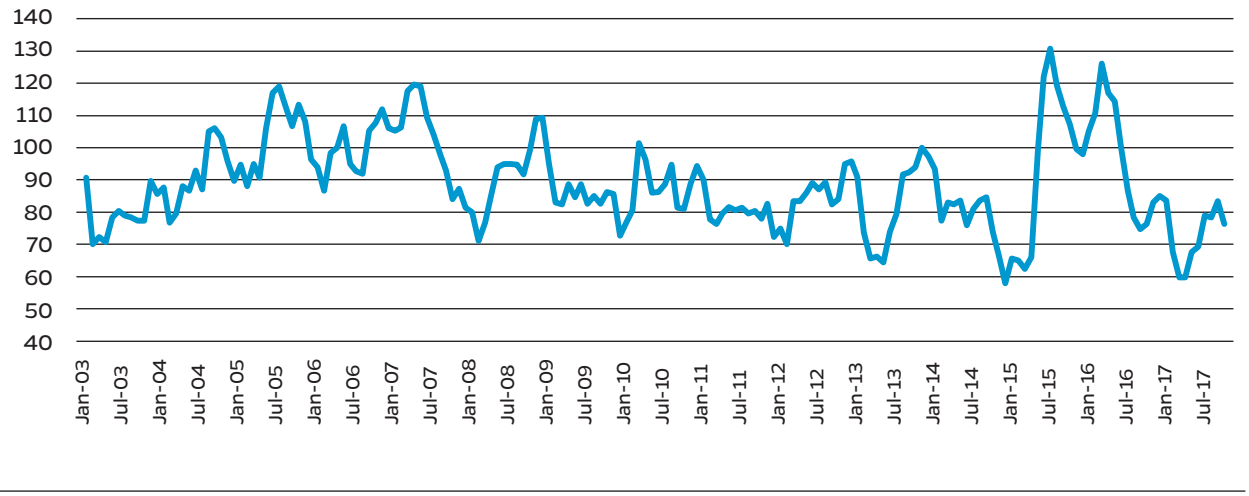
Arrests for distribution and manufacture of controlled and dangerous substances have declined steadily since January 2009 and dropped more precipitously since the summer of 2016 (Figure 4).

Figure 4. Three-month moving average of drug distribution arrests, 2003-2017



In contrast, trends in arrests for illegal weapon possession increased during 2003-2005, dipped slightly from 2007 to 2008, and then experienced relatively little change during 2008-2014. Gun possession charges increased in July 2015 before declines occurred during the fall of 2016 through the end of 2017 (Figure 5). It is worth noting that BPD's number of sworn officers declined over the course of the study period.

Figure 5. Three-month moving average of weapon possession arrests, 2003-2017



Interpreting trends in arrests for illegal drugs and illegal weapon possession is difficult because one cannot determine with certainty the degree to which the changes over time reflect changes in illegal activities, enforcement practices, or both. That said, the trends suggest that BPD shifted its emphasis away from drug arrests toward arrests for illegal weapon possession over the past nine years.

Estimates of Effects of Interventions

The tables on the next page present the estimates from the negative binomial regression models after converting the coefficients to incident rate ratios (IRR). Data from Table 1 indicate that changes in the number of homicides within police posts per month were largely unrelated to law enforcement activities and *Safe Streets*, with some exceptions. Deployment of VCIS was associated with a 12%-13% reduction in homicides and was statistically significant at the .10 level. Our estimates of the impact of surges in arrests for illegal drug distribution within police posts, and of major drug busts over any of the assumptions regarding the areas and number of months where the effects of these actions might have impacted gun violence, reveal no evidence of impact on homicides. The *Ceasefire* program of focus deterrence was not associated with any change in the number of homicides in the areas where the program was active. There were also no effects of *Safe Streets* on homicides when the effects were aggregated across all sites implementing the program since 2007. Models that estimated the effects for each specific site revealed a 39% reduction in homicides in Cherry Hill since the site opened in 2008 (IRR=0.61, p=0.087), but homicides doubled during the brief period (20 months) in which Elwood Park had an operating site (IRR=2.16, p=0.015). The bottom rows of the last column of Table 1 include estimates from

interactions between the effects of law enforcement activities and *Safe Streets* sites-specific effects with the "After Unrest" indicator variable. Increases in the number of arrests for drug possession during the period after the 2015 unrest were linked with increased risks for homicides. Although the effects were not statistically significant, there is a large difference in the estimated effect of Cherry Hill's *Safe Streets* site prior to the unrest (IRR=0.55, p=0.082) and after the unrest (IRR=1.35, p=0.480).

Estimates for the effects of the interventions on nonfatal shootings are presented in Table 2 and reveal a protective effect of VCIS deployment to gun violence hot spots, resulting in 19% fewer shootings than predicted had there been no VCIS deployment. A surge in the number of arrests for illegal drug distribution was followed by a 16% reduction in shootings during the following month but were linked to increases in shootings of 12% to 21% over a span of 3- to 12-month post-surge period. In all models for nonfatal shootings, increasing arrests for drug possession in a post in a given month was followed by more shootings the following month. In contrast, major drug busts, which presumably are more focused on groups connected to gun violence and strategic with respect to prosecutions, were followed by 6 months of 25% lower levels of shootings than predicted had there been no drug bust. Consistent with the models for homicides, there was no evidence that *Ceasefire* affected nonfatal shootings.

The estimated effect of *Safe Streets* averaged across all sites and all time periods was an 8% to 9% reduction in nonfatal shootings; however, the reduction was not statistically significant. The site-specific estimates reveal no clear and statistically significant effects of *Safe Streets*; however, Cherry Hill's program was associated with a 30% reduction in nonfatal shootings since the program was implemented in 2008 (p=.108). Three other sites had estimates in the direction of protective effects against shootings of 17% to 37%, and Sandtown-Winchester was in the direction of more shootings; however, none of these site-specific estimates approached statistical significance. Our team will be performing additional statistical procedures (e.g., synthetic control models) that may increase the precision of our estimates of site-specific program effects and allow us to better assess whether the pattern of estimates is likely to reflect real effects or statistical noise.

The EBDI redevelopment of the area north of the Johns Hopkins Medical campus was associated with reductions in homicides in the redeveloped areas and adjacent police posts of 22% to 25% (Table 1). EBDI had a similarly protective effect on nonfatal shootings, an estimated 32% reduction in the direct area and a 19% reduction in adjacent police posts (Table 2).

12%-13%
Reduction in homicides since deployment of VCIS

32%
Reduction in nonfatal shootings (EBDI)

19% **Fewer shootings than predicted had there been no VCIS deployment**

22%-25% **Homicides reduction in EBDI redevelopment of the area north of the Johns Hopkins Medical campus**

Table 1. Estimates (IRR) of the effects of place-focused enforcement and prevention on monthly homicides in police posts.

	Base Model (1)	(1) + drug distribution arrest surges + major drug busts	(1) + drug distribution arrest surges + *Safe Streets* sites	(1) + drug distribution arrest surges + *Safe Streets* sites + Unrest interaction terms
After 2015 civil unrest	**1.55 (0.002)**	**1.55 (0.002)**	**1.55 (0.002)**	**1.51 (0.005)**
Violent Crime Impact Section	**0.88 (0.091)**	**0.87 (0.076)**	**0.87 (0.077)**	**0.87 (0.083)**
Ceasefire (focused deterrence)	1.06 (0.485)	1.07 (0.442)	1.05 (0.561)	1.03 (0.718)
Safe Streets	1.07 (0.620)	1.07 (0.620)		
Drug Possession arrests (1-mo lag)	1.00 (0.831)	1.00 (0.877)	1.00 (0.905)	1.00 (0.851)
Drug Distribution arrests (1-mo lag)	1.00 (0.667)	1.00 (0.546)	1.00 (0.585)	1.00 (0.542)
Weapon Possession arrests (1-mo lag)	1.00 (0.941)	1.00 (0.879)	1.00 (0.927)	1.01 (0.761)
EDBI Redevelopment	0.75 (0.101)	0.76 (0.105)	0.76 (0.105)	0.76 (0.117)
EDBI Redevelopment Spillover	**0.78 (0.075)**	**0.77 (0.065)**	**0.77 (0.067)**	**0.76 (0.064)**
Drug Distribution surge 1-mo lag		0.83 (0.140)	0.84 (0.155)	0.84 (0.161)
Drug Distribution surge 2-mo lag		0.85 (0.104)	0.85 (0.111)	0.86 (0.130)
Drug Distribution surge 3-mo lag		1.06 (0.521)	1.06 (0.499)	1.07 (0.442)
Drug Distribution surge 4-mo lag		0.97 (0.723)	0.97 (0.752)	0.98 (0.792)
Drug Distribution surge 5-mo lag		1.05 (0.617)	1.05 (0.588)	1.06 (0.551)
Drug Distribution surge 6-mo lag		0.98 (0.804)	0.98 (0.825)	0.99 (0.885)
Drug Distribution surge 9-mo lag		0.89 (0.227)	0.90 (0.244)	0.90 (0.271)
Drug Distribution surge 12-mo lag		1.15 (0.121)	1.15 (0.115)	1.15 (0.102)
Drug Bust 1-mo effect		0.95 (0.917)		
Drug Bust 2-mo effect		0.80 (0.495)		
Drug Bust 3-mo effect		0.84 (0.495)		
Drug Bust 4-mo effect		1.00 (0.991)		
Drug Bust 5-mo effect		1.05 (0.771)		
Drug Bust 6-mo effect		0.99 (0.932)		
Drug Bust 9-mo effect		0.99 (0.951)		
Drug Bust 12-mo effect		1.00 (0.991)		
***Safe Streets* Site Estimate**				
Cherry Hill			**0.61 (0.087)**	**0.55 (0.82)**
Elwood Park			**2.16 (0.015)**	**2.19 (0.014)**
Madison—Eastend			1.39 (0.496)	1.39 (0.504)
McElderry Park			0.99 (0.974)	1.07 (0.822)
Mondawmin			1.43 (0.329)	1.23 (0.670)
Lower Park Heights			0.96 (0.921)	1.19 (0.751)
Sandtown			1.11 (0.828)	1.11 (0.830)
Interactions with After Unrest				
Drug Possession arrests				**1.03 (0.033)**
Drug Distribution arrests				0.99 (0.756)
Weapon Possession arrests				0.96 (0.3090
Safe Streets—Cherry Hill				1.35 (0.480)
Safe Streets—Mondawmin				1.41 (0.567)
Safe Streets—Lower Park Hts				0.72 (0.621)

Estimates in bold indicate statistical significance at the p equals or less than 0.10

Table 2. Estimates (IRR) of the effects of place-focused enforcement and prevention on monthly nonfatal shootings in police posts.

	Base Model (1)	(1) + drug distribution arrest surges + major drug busts	(1) + drug distribution arrest surges + *Safe Streets* sites	(1) + drug distribution arrest surges + *Safe Streets* sites + Unrest interaction terms
After 2015 civil unrest	**1.64 (<0.001)**	**1.65 (<0.001)**	**1.65 (<0.001)**	**1.58 (<0.001)**
Violent Crime Impact Section	**0.81 (<0.001)**	**0.81 (<0.001)**	**0.81 (0.001)**	**0.81 (<0.001)**
Ceasefire (focused deterrence)	1.11 (0.110)	**1.12 (0.088)**	1.11 (0.135)	1.09 (0.118)
Safe Streets	0.91 (0.391)	0.92 (0.384)		
Drug Possession arrests (1-mo lag)	**1.00 (0.013)**	**1.00 (0.017)**	**1.00 (0.021)**	**1.00 (0.017)**
Drug Distribution arrests (1-mo lag)	1.00 (0.867)	1.01 (0.243)	1.01 (0.254)	1.01 (0.232)
Weapon Possession arrests (1-mo lag)	1.00 (0.969)	1.00 (0.890)	1.00 (0.909)	0.99 (0.309)
EDBI Redevelopment	**0.68 (0.003)**	**0.69 (0.003)**	**0.69 (0.004)**	**0.69 (0.004)**
EDBI Redevelopment Spillover	**0.81 (0.043)**	**0.80 (0.035)**	**0.80 (0.036)**	**0.80 (0.037)**
Drug Distribution surge 1-mo lag		**0.84 (0.048)**	**0.84 (0.055)**	**0.84 (0.053)**
Drug Distribution surge 2-mo lag		1.03 (0.694)	1.03 (0.667)	1.03 (0.673)
Drug Distribution surge 3-mo lag		**1.21 (0.002)**	**1.22 (0.002)**	**1.21 (0.002)**
Drug Distribution surge 4-mo lag		**1.15 (0.036)**	**1.15 (0.034)**	**1.15 (0.033)**
Drug Distribution surge 5-mo lag		**1.18 (0.012)**	**1.18 (0.011)**	**1.18 (0.010)**
Drug Distribution surge 6-mo lag		1.10 (0.117)	1.11 (0.115)	1.11 (0.116)
Drug Distribution surge 9-mo lag		**1.17 (0.013)**	**1.17 (0.012)**	**1.17 (0.012)**
Drug Distribution surge 12-mo lag		**1.12 (0.076)**	**1.12 (0.076)**	**1.12 (0.074)**
Drug Bust 1-mo effect		0.59 (0.231)		
Drug Bust 2-mo effect		(0.67 (0.152)		
Drug Bust 3-mo effect		0.76 (0.182)		
Drug Bust 4-mo effect		0.75 (0.109)		
Drug Bust 5-mo effect		**0.76 (0.087)**		
Drug Bust 6-mo effect		**0.75 (0.048)**		
Drug Bust 9-mo effect		0.89 (0.304)		
Drug Bust 12-mo effect		0.94 (0.539)		
***Safe Streets* Sites**				
Cherry Hill			0.70 (0.108)	0.66 (0.109)
Elwood Park			0.83 (0.546)	0.83 (0.547)
Madison—Eastend			0.63 (0.339)	0.63 (0.343)
McElderry Park			1.13 (0.571)	1.13 (0.569)
Mondawmin			1.43 (0.329)	1.23 (0.670)
Lower Park Heights			0.88 (0.658)	1.25 (0.591)
Sandtown			1.13 (0.718)	1.13 (0.718)
Interactions with After Unrest				
Drug Possession arrests				1.00 (0.879)
Drug Distribution arrests				1.00 (0.972)
Weapon Possession arrests				**1.05 (0.063)**
Safe Streets—Cherry Hill				1.18 (0.634)
Safe Streets—Mondawmin				2.16 (0.120)
Safe Streets—Lower Park Hts				0.60 (0.304)

Estimates in bold indicate statistical significance at the p equals or less than 0.10

Discussion

Like most U.S. cities, gun violence in Baltimore is concentrated in areas of concentrated social and economic disadvantage. Addressing the structural conditions and public policies that bring about the conditions that breed violence is extremely challenging, requiring considerable resources, political will, effective policy solutions and many years. This study examines short-term strategies that are focused or applied within specific places where gun violence has become all too common to directly influence behaviors that increase risks for violence—illegal gun possession, selling and using illegal drugs, and conflicts and provocations among groups and individuals at highest risk for involvement in gun violence.

Over the study period covering 2003-2017, drug law enforcement—once considered by law enforcement to be the most appropriate tool for combatting gun violence in Baltimore – changed dramatically. Arrests for illegal possession and distribution of drugs in 2017 were a fraction of what they were during the 2003-2006 period. Our most direct measures of BPD's drug law enforcement—the number of arrests within a given police post and month and "surges" in arrests for illegal drug distribution within a post—provide evidence that these arrests are more likely to spur more gun violence than to reduce it. Although surges in arrests for illegal drug distribution may have a very short-term (1-2 months) violence-reducing effect in an area, there appear to be violence-generating effects up to a year after these drug arrest surges. Higher numbers of shootings also tend to follow after increases in arrests for illegal drug possession. Our admittedly limited measure of major drug busts, however, was associated with a 25% reduction in nonfatal shootings over a six-month period following the busts. These findings suggest that drug law enforcement could be applied in a more limited but strategic manner toward the most violent actors in the illegal drug market and, importantly, deter those involved in the illegal drug economy from engaging in gun violence. The powerful market forces at play—a high demand for illegal drugs in a city where addiction is highly prevalent and a large supply of labor exists, with many individuals willing to engage in very dangerous work due to the lack of legal employment opportunities for individuals with criminal histories—and available research evidence suggests that drug law enforcement efforts rarely have lasting positive impacts on violence.[4-6,11]

Research on focused deterrence interventions conducted in many U.S. cities suggests that strategic, targeted enforcement actions taken against individuals and groups involved in illegal drug sales who are responsible for a disproportionate share of urban gun violence reveal a consistent record of producing relatively large reductions in shootings.[3] Unfortunately, Baltimore's *Ceasefire* focused deterrence program did not affect levels of gun violence in the communities in which it was implemented. Concerns were raised by staff and community members that there were insufficient resources and commitment to deliver promised services to individuals targeted by the program. There were also questions about whether the right individuals were being targeted. Any future efforts to implement the program model will need to address these concerns to be effective and gain acceptance.

A 2012 evaluation of *Safe Streets* revealed statistically significant reductions in one or more measures of gun violence in three of the four sites examined[7] as well as evidence that the program was linked to less support among youth for using guns to resolve conflicts. A recent test of the program's effects on youths' attitudes about using violence in Park Heights produced similarly promising findings.[9,10] Yet this analysis of the most recent data present a less clear picture of program effects over the long term. The long-standing *Safe Streets* site in Cherry Hill may hint at some important lessons for widespread program effect. The geography of the neighborhood may make it easier for *Safe Streets* workers to suppress violence and promote nonviolent resolution to conflicts within the neighborhood without

having to worry as much as the other sites about conflicts and threats that come from outside the boundaries of the program. Furthermore, Cherry Hill is a community that has had a history of successfully organizing itself to address public safety concerns. The direction of the estimated program effects on gun violence in Park Heights is encouraging. The number of workers and supporting services needed to create and sustain program effects is likely to vary depending on the needs and risks for violence within the community. Three of the program sites examined in this study were eventually shut down due to disappointing program effects and implementation problems. Sandtown-Winchester is a community with the most challenging social conditions in the city and faces unique challenges for public safety due to transportation hubs in and near the area.

The Cure Violence model used by *Safe Streets* has been used with success in Chicago,[12] Philadelphia[13] and especially in New York City,[14,15] where the mayor's office and foundations have provided exceptional support both financially and with wraparound services for the high-risk individuals engaged by outreach staff, including assistance with finding employment. Recent evaluations from those cities have shown consistently positive program effects both in reducing gun violence as well as in promoting social norms among youth that eschew the use of guns to respond to conflicts.

The pattern of findings in Baltimore and in other cities leaves us optimistic that increased commitment to provide *Safe Streets* workers with greater supports with respect to their salaries, the number of workers committed to an area, better collaboration with other community-based organizations, the delivery of services to address program participants' needs, and following implementation models used in New York, will produce meaningful reductions in gun violence in the communities served by the program.

Consistent with findings from other studies, BPD's deployment of specialized police units targeting violence and illegal weapon possession in areas with the highest rates of shootings appeared to have suppressed gun violence in those areas. BPD's Violent Crime Impact

Section, however, also generated many complaints of abuse and lawsuits resulting in settlements costly to the city.[16] In 2013, a member of VCIS admitted to falsifying reports after federal charges were brought against the officer.[17] More recently, eight members of a separate gun unit, the Gun Trace Task Force, were charged with an array of illegal activities, including planting evidence. Thus, our research on BPD's recent experience with specialized gun law enforcement units documents the ability of such units to curtail shootings. But without sufficient professionalism, oversight and accountability, such units can cause serious harm to individuals in the communities they are supposed to protect and to the department's reputation, undermining its long-term effectiveness.

Given the importance of illegal gun possession in contributing to Baltimore's extraordinarily high rate of homicide and other violent crime that is traumatizing communities, we believe that BPD must focus on combatting illegal gun possession by individuals engaged in violent crime. But it must do so only in a manner that is legal, professional, and acceptable to the communities they serve. This imperative drove the development of a new project supported by the Johns Hopkins-Baltimore Collaborative for Violence Reduction to assist BPD in the development of policies to improve the quality of proactive gun law enforcement.

The goals of the project are to:

1) **improve accurate evidence gathering and reporting of arrest involving illegal gun possession;**
2) **address community concerns relevant to proactive gun law enforcement;**
3) **substantially reduce illegal searches;**
4) **reduce the share of illegal gun possession cases with Nolle Pros dispositions; and**
5) **acknowledge officers engaged in high-quality proactive gun law enforcement.**

Key to achieving these goals will be a system of accountability that identifies and corrects problematic practices through enhanced supervision and training of officers.

To aid in this effort, databases are being developed to track each officer's gun-related arrests, the dispositions of those cases, reasons for charges being dismissed, and complaints against officers. Rather than rewarding officers principally for the number of illegal gun arrests made, BPD will recognize officers who have the most solid gun cases with the highest professional standards while providing officers with feedback, training, and, if necessary, disciplinary actions in order to establish and maintain high standards for proactive gun law enforcement. JHU Collaborative researchers will be conducting community surveys and focus groups to assess community concerns regarding policing practices relevant to illegal gun possession and promote BPD policies that address these concerns. BPD's policies will also be informed by a JHU review of policies and procedures being used by other law enforcement agencies to curtail illegal gun possession and violence while promoting practices that are constitutional, professional and acceptable to communities.

Initiatives recently launched in Baltimore to address violence reduction more from a problem-solving approach through coordinated city services and Neighborhood Coordinating Officers in the Transformation Zones and the Violence Reduction Initiative represent a new approach for addressing violence in some of the city's most challenged neighborhoods. The nature and extent of the problems in these neighborhoods require a long-term lens, as do plans to evaluate the efficacy of these efforts.

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Funding for the research came from grants to the Johns Hopkins Center for Gun Policy and Research from The Abell Foundation and The Annie E. Casey Foundation and to the Johns Hopkins Center for the Prevention of Youth Violence from the Centers for Disease Control and Prevention.

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